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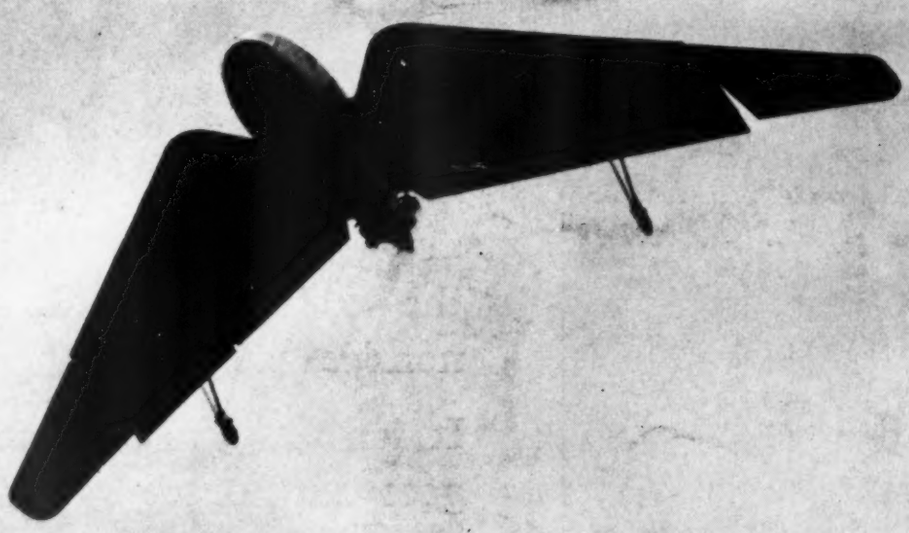

A pterodactyl in flight at the R. A. F. Display at Hendon Airdrome, London, England

VOLUME XXV

NUMBER 4

Special Features

The Berliner Monoplane

How to Splice a Wooden Wing Beam

Inspection Methods for Whirlwind Engines

AVIATION PUBLISHING CORPORATION
250 WEST 57TH STREET, NEW YORK

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★ ★ ★

The opinion of one qualified by extensive experience in aviation to pass judgment on the performance of an aircraft engine is both instructive and valuable. Before you buy an airplane, consider carefully the power unit — if it be a low-powered commercial, pleasure or weight-carrying 'plane, realize that *proof of* Fairchild Caminez* *performance* is in knowing first hand.

For Caminez particulars, write the Fairchild Caminez Engine Corporation, Farmingdale, Long Island, N.Y.

SUBSIDIARY OF FAIRCHILD AVIATION CORP.

HADLEY AIRPORT
NEW BRUNSWICK, N. J.

May 26, 1928.

Major Talbot O. Freeman, Vice-President,
Fairchild Caminez Engine Corporation,
Farmingdale, Long Island, N. Y.

Dear Sir:

Your claim of 40% increase in climb as a result of half-speed propeller efficiency seems absolutely justified.

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The take-off was remarkably quick and gave me the impression that the 'plane was in flight after a 100 ft. run. The climb to 2000 feet which followed was at a very rapid rate due to the high propeller efficiency. The engine revolutions were then tried from 800 to 1100 in dives, slips and climbs, and the continued smoothness of all engine speeds was apparent.

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Sincerely yours,

A. Raymond Brooks

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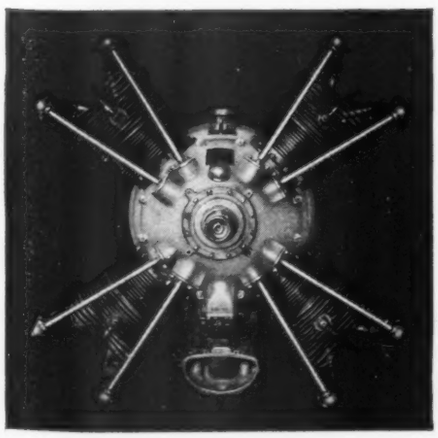

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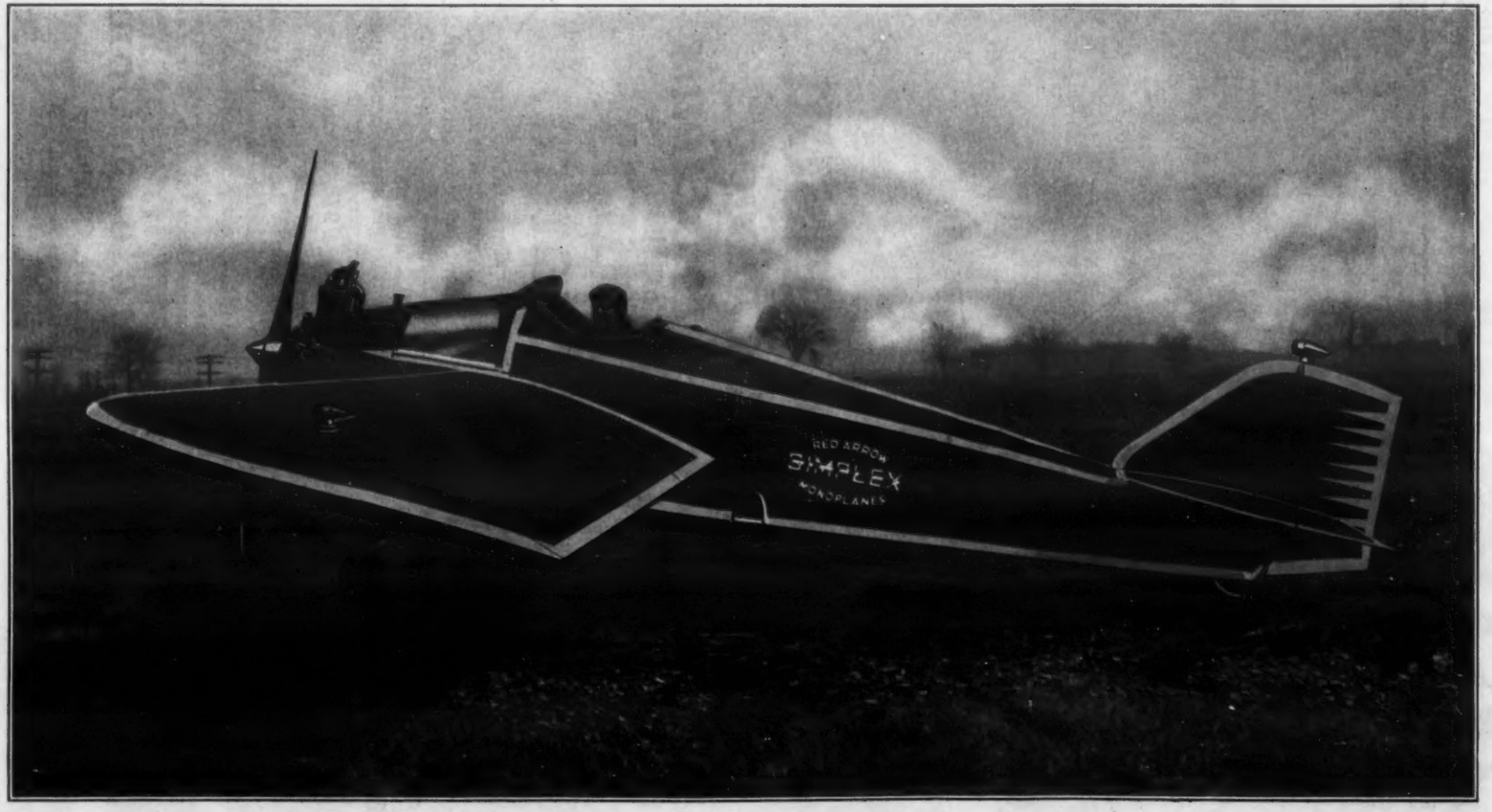

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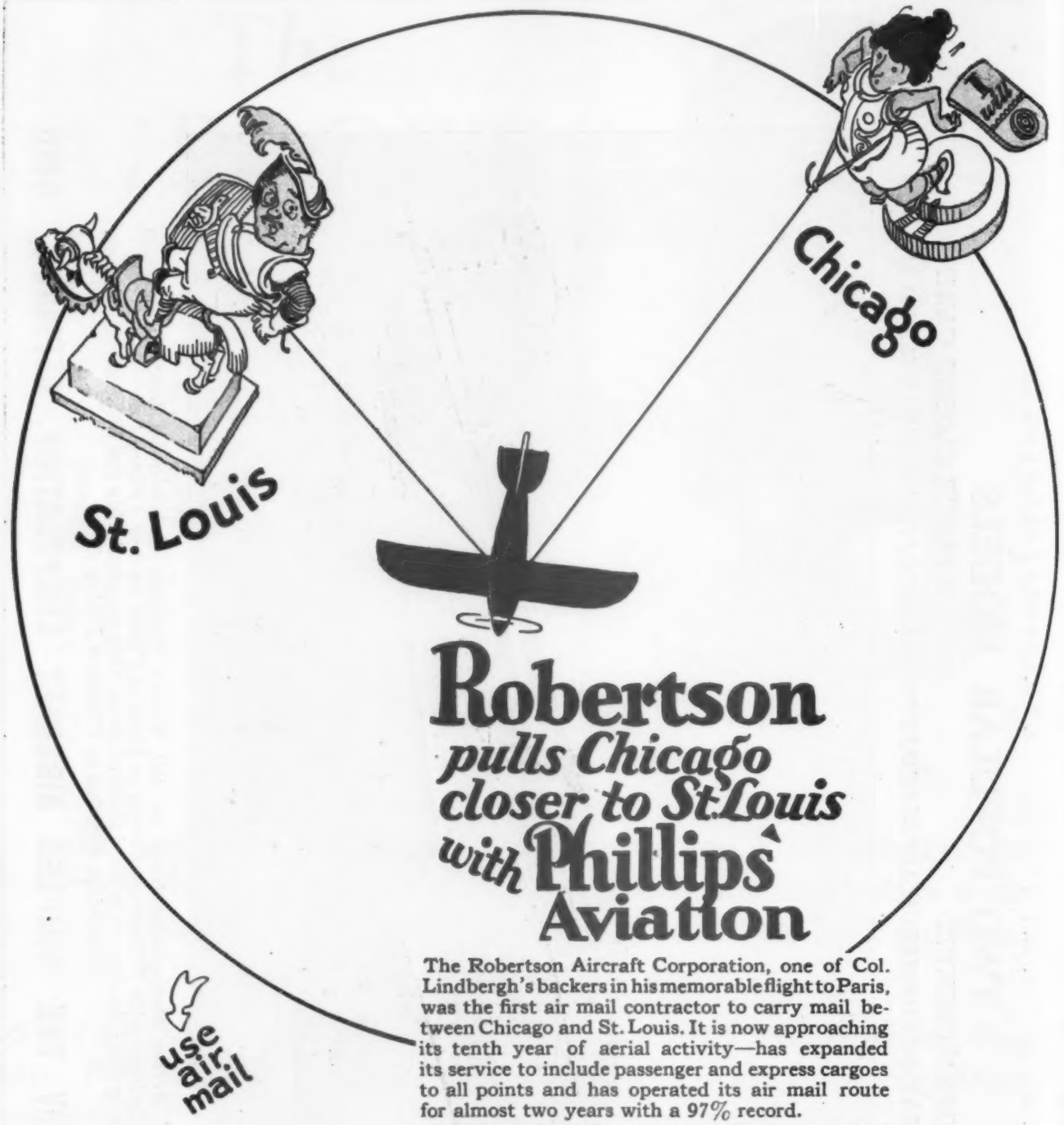

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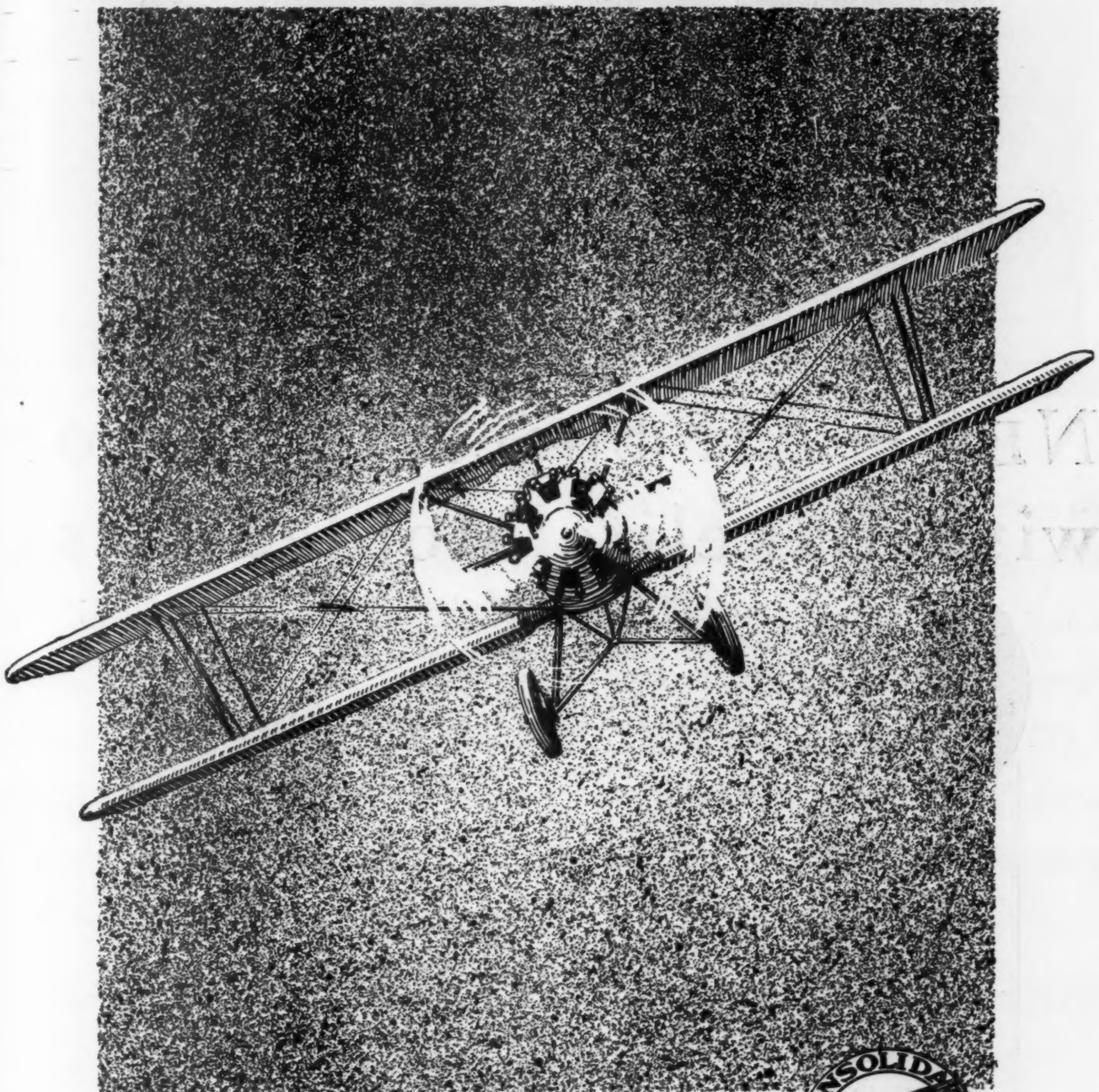
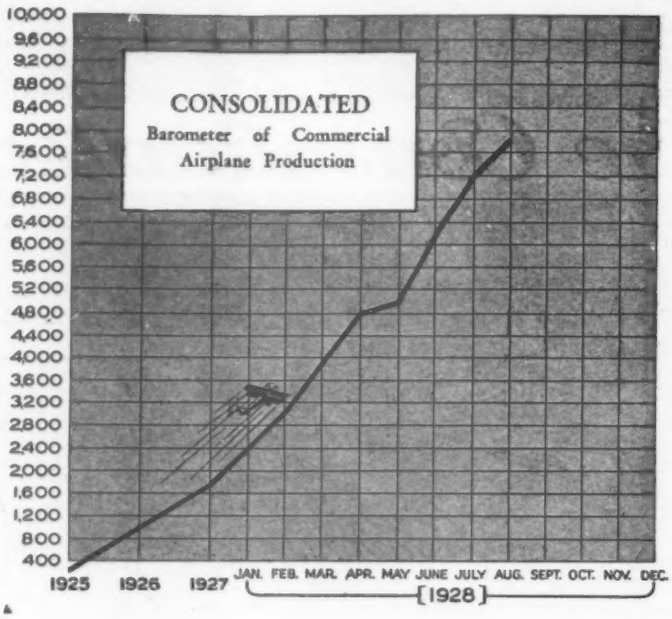


Consolidated Aircraft Corporation
Buffalo, N.Y.

CONSOLIDATED AIRCRAFT

THE accompanying chart visualizes the constant growth of airplane production . . . and the present approximate rate of manufacture (planes per 12-month period) . . . as indicated by the current delivery schedule of Consolidated Instruments.

Consolidated Instruments, singly or in sets, are used on approximately 98% of the commercial airplanes manufactured in the United States.



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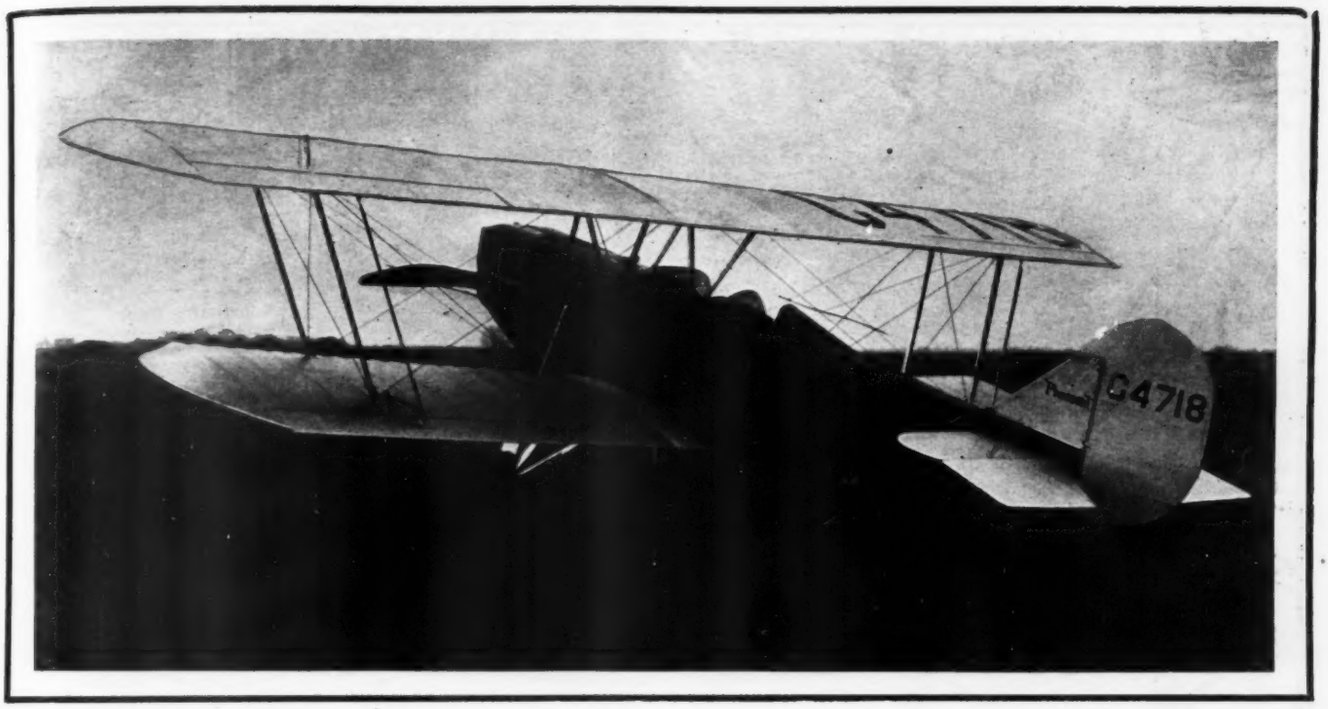

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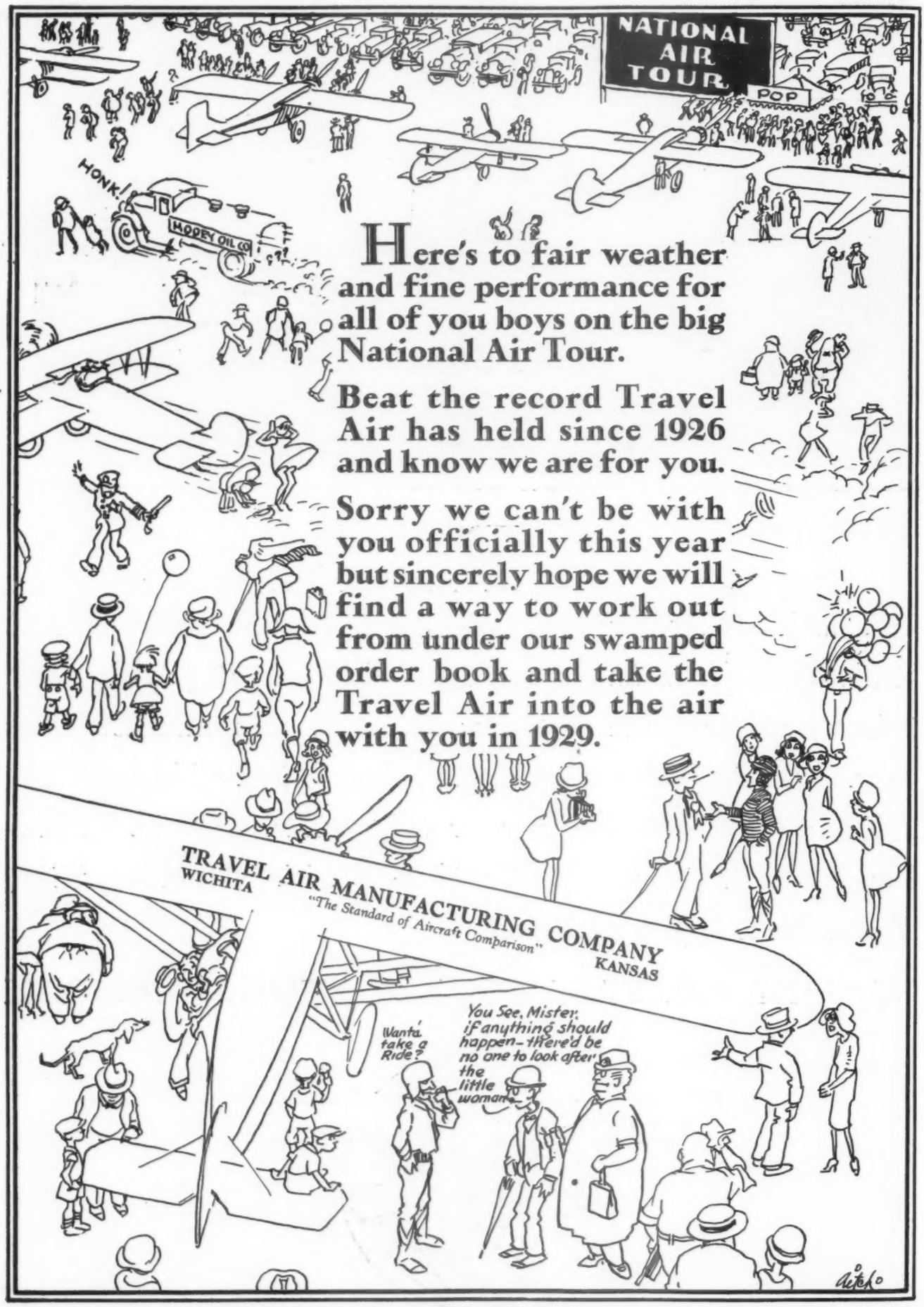
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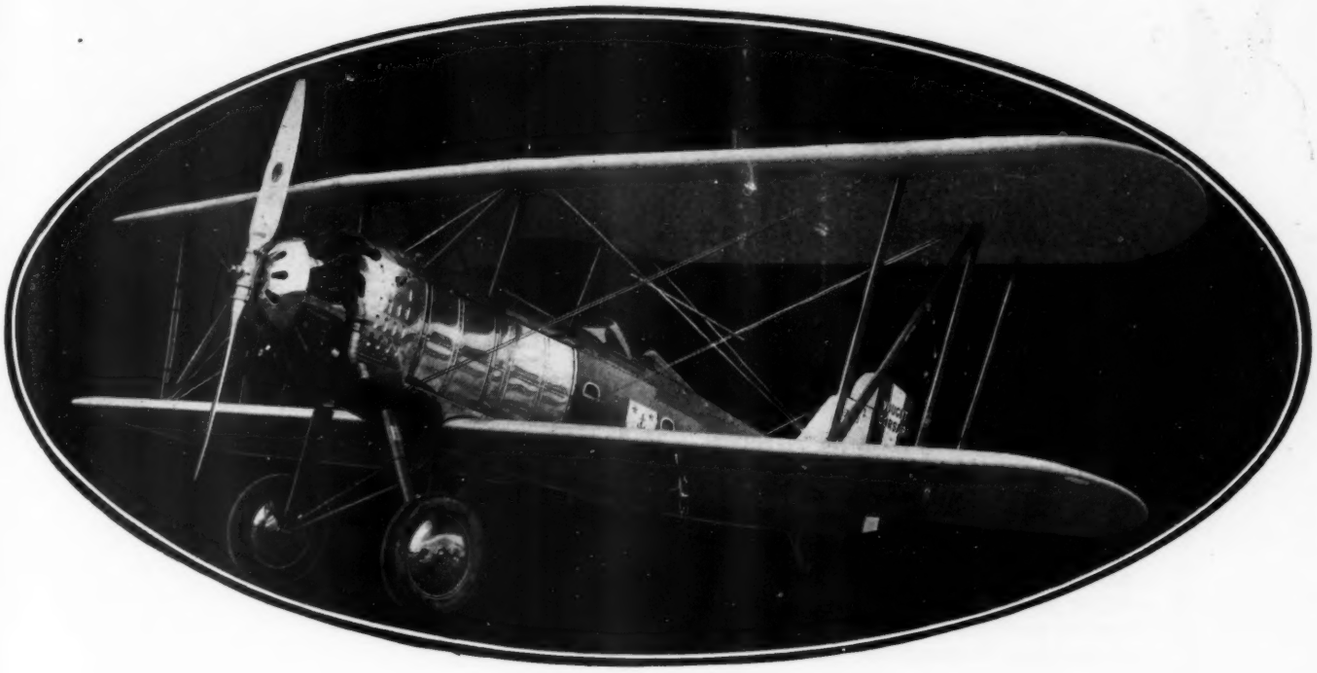

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January	Three Planes Weekly
February	Four Planes Weekly
March	Five Planes Weekly
April	Nine Planes Weekly
May	Twelve Planes Weekly
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A ship completed, tested and ready for delivery every 150 minutes in June! . . . A ship delivered every 130 minutes in July! Distributors, dealers and owners alike will appreciate the particular significance of this unique accomplishment, in view of the fact that no detail of design, materials, construction or inspection has been sacrificed to increase production.

The American Eagle Aircraft Company and American Eagle Distributors are glad—just as they have been in the past—to match performance with any ship in recognized Air Meets, confident that the American Eagle is more than ever the outstanding plane in its power and price class.

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This organization with a wealth of experience in relation to the country's leading drainage engineering projects is making an exhaustive study of airport soils, ground cover which helps maintain a firm surface and sub-soil and other vital elements within the scope of drainage engineering.

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Modern, scientific soil drainage prevents today the condition revealed by the costly accident of tomorrow.

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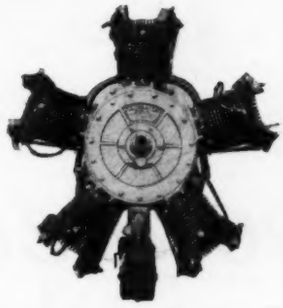

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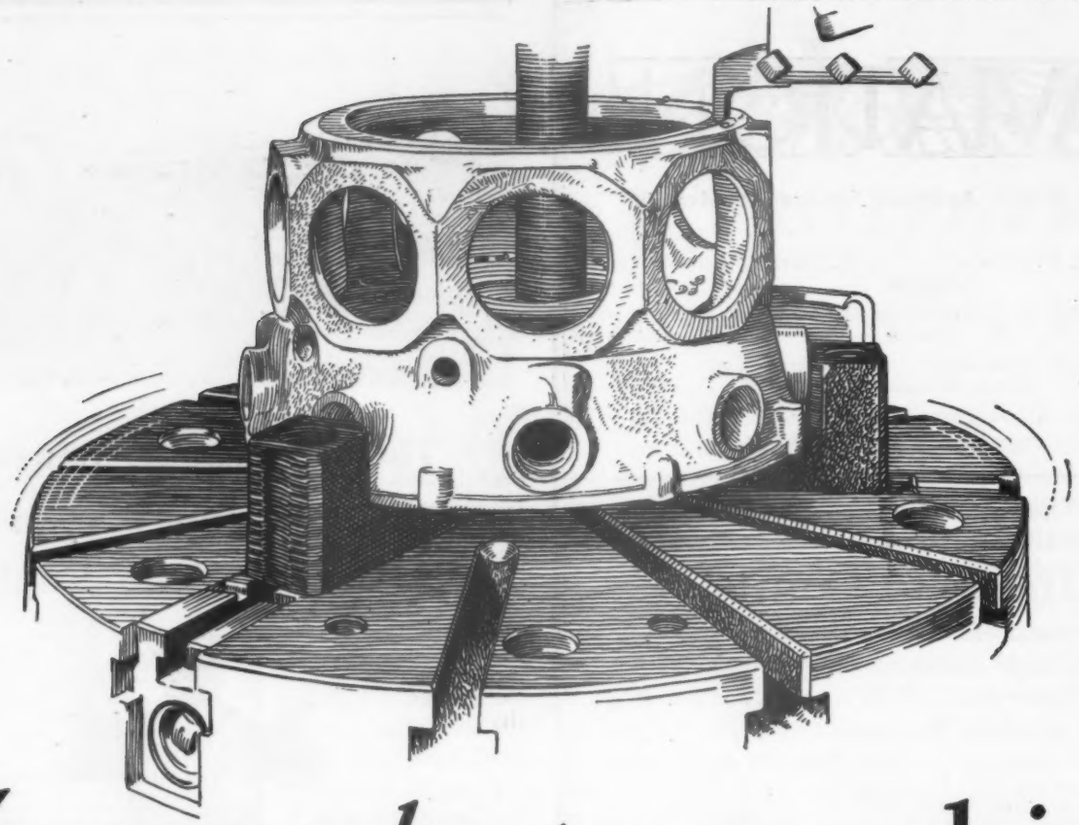


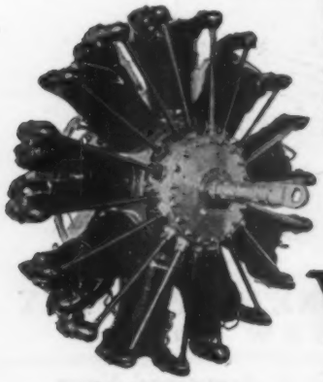
Two weeks to machine a crankcase section~

ALUMINUM, known for the tricks it plays in process, is most sensitive to the treatment of cutting tools; yet most essential to the lightness of a fine aircraft engine. It strains against its moulded shapes; it swells from heat generated in machining. One section will warp in protest at the treatment given another.

Two weeks go by before a crankcase casting is fully machined ready to be assembled in an engine. Two weeks—time not necessary for machining alone but time which Wright machinists know should be allowed for readjustment of the metal between successive operations. These men know their metal—know its peculiarities of stress and strain—its tendency to warp and run out of shape under the heat generated by cutting tools. Each man knows how much heat the part he makes will stand before expanding—knows how much heat each cut involves—knows when to stop before warping begins. He will machine one part; then jump to another. He knows when a casting needs a "rest", and sets it aside for two days, or even three, before machining again.

By such careful procedure, Wright Crankcases are brought into shape without strain; machined thinner and lighter with no sacrifice of strength; worked slowly to the point where the finished piece is worthy of being called the "finest aluminum casting made."

Another reason "Why More Pilots Fly Them."



Wright "Cyclone" Aeronautical Engine

That's why More Pilots fly them!

WRIGHT

WRIGHT AERONAUTICAL CORPORATION

Paterson, N. J., U. S. A.

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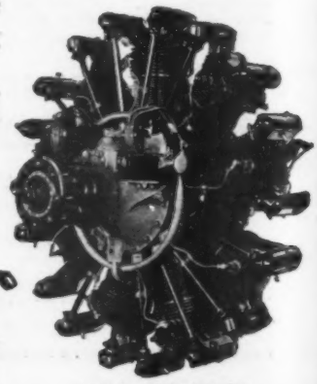


Wright "Whirlwind" Aeronautical Engine

AVIATION

The Oldest American Aeronautical Magazine

Vol. XXV ***JULY 21, 1928*** **No. 4**

A Step Forward

IN KEEPING with the altogether satisfying development and expansion of the American aeronautical industry, this issue marks a step forward in the progress of AVIATION. Since the publishing of its first issue twelve years ago AVIATION has striven to keep its readers well informed on all subjects pertaining to aeronautics, particularly those of a technical nature. In short AVIATION has developed with American Aeronautics.

Within the last two years commercial aviation in this country has been transformed from an air game to an air industry. And as a result of this transformation there are many additional problems to be solved. They can only be solved by applying modern business methods to the special conditions that exist. Such being the case we believe that there is a need for a modern aeronautical business publication. To supply this need and to maintain the leadership in the aeronautical publishing field it has become necessary to enlarge, the printing facilities of AVIATION.

Under the new arrangement AVIATION will henceforth be published on Saturday instead of Monday. By thus avoiding the week-end mailing congestion we believe that it will be possible for copies of each issue to reach the readers much sooner than has been the case in the past. In addition to the feature story section AVIATION will contain a classified news section containing mention of all important trade events up to within three days of the publication date. A new section entitled "The Buyers' Log Book" has also been included and will contain short descriptions of new equipment, accessories, materials, etc., that are of interest to the members of the industry.

AVIATION not only intends to adhere to its original editorial policies and maintain its reputation as a technical authority, but in addition, to extend its scope of service to its readers by supplying them with more timely and detailed information relative to the business aspects of aeronautics.

The Reliability Tour

IT IS perhaps too early to write about the National Air Tour, but there is no doubt but that some of the fundamental conditions on which the contest was based have been decidedly altered since the first tour. To begin with, the need for publicity has diminished, or rather the publicity given the tour has been overshadowed by the spectacular feats of the past year and by the general acceptance on the part of the public that cross-country flying in short jumps is no longer unusual or remarkable. The endurance feature of the tour as far as planes are concerned, is a thing of the past. It would take a tour of over 100,000 miles to wear out present day planes.

Weaknesses in engines, especially experimental engines, are apt to be brought out by these tours, but here sometimes the engine failure is not due so much to a weakness as it is to the pilot driving his engine beyond the designed limit. The efficiency feature of the tour, and especially the actual performance figures obtained, are of real value to the buyer of planes. However, no formula can be devised that would permit a fair comparison of planes of varied sizes and designed for different purposes. To dealers along the route and to prospective purchasers the tour continues to be of increasing value. To the manufacturer, the tour gives an occasion to contact with dealers, but what is perhaps more important, it gives him a very valuable chance to compare his product with that of other manufacturers.

The Reliability Tour has been and is a most valuable factor in the commercial development of American aviation, but if it is to continue to be valuable under the new conditions, certain changes will probably have to be made and it is to be hoped that manufacturers and dealers will take time to give the matter serious consideration.

Morris Titterington

BY the death of Morris Titterington the aeronautical industry has lost one of its most progressive and valuable members. His special field was that of aircraft instruments, and no one has contributed more to the difficult and delicate task of providing suitable instruments for airplanes. The earth inductor compass will remain as a monument to his name. The work which he has done will leave a lasting impression, and every one who flies is to a greater or lesser degree indebted to him.

Mr. Titterington learned to fly at the Glen Curtiss Flying School at Hammondsport, Long Island, in 1914, at which time he became fully aware of the need of better instruments for aircraft. He then joined the Sperry Gyroscope Co. and later was sent to France and England on instrument work until the early days of the World War. During the World War he worked with the Sperrys in the development of an aerial torpedo. Seven years ago, with Charles Colvin and the late Bryce Goldsborough, he formed the Pioneer Instrument Co. As its chief engineer he developed and built many of the instruments which have been so successfully used by the air mail and in long distance flights.

Mr. Titterington's death has been a real blow to his many friends and associates and we wish to extend to them our sincere sympathies.

Inspection Methods *for* Whirlwind Engines

By H. W. Roughley
Quality Manager, Wright Aeronautical Corp.

ONE of the problems that has seemed to puzzle even the minds of internal combustion engine manufacturers is: "Why cannot aircraft engines be built with the same reliability in production using standard automobile practices?"

It is a well-known fact that a number of large organizations have endeavored to manufacture aircraft engines and have met with many disheartening obstacles. There has seemed to be a peculiar combination of circumstances which arises by using an internal combustion engine in an airplane which tends to break down metals which would ordinarily give long and satisfactory service in other types of internal combustion engines.

Inspection is one of the most important phases of aircraft engine manufacture. The Wright Aeronautical Corp. of Paterson, N. J., producing the Wright "Whirlwind" engines, has established a series of systematic inspections of material which in a great measure has been responsible for the reliability of this particular power plant.

Reliability Demonstrated

The fact that Colonel Lindbergh and others who have crossed the North Atlantic, Maitland and Hegenberger and the others who have crossed the Pacific and Chamberlin and Stinson on establishing the world's endurance records, all used Whirlwind engines shows the reliability which has been incorporated in the stock aviation power plants produced by the Wright Company.

Graphically, all the metal used in these engines—from the crude state until it is finally assembled in the finished product—is subject to a series of rigid inspections which do not permit much leeway for inherent weaknesses to pass unnoticed.

It is too great a task to cover the entire field of inspection in one article, and so at this time we will endeavor to expose the activities of the inspectors of purchase parts and rough stock.

Raw material, such as bar stock, forgings and castings, which will meet chemical and physical requirements and at the same time be free from seams, cracks, laps, blowholes and mis-runs, must be carefully inspected upon receipt. This material is delivered to the Inspection Department accompanied by receiving reports showing the size, specification and quantity. After checking material for quantity, size and certified chemical properties against the purchase order, it is further checked against a bill of material and also against drawings to insure its conformance with engineering requirements.

When bar stock is purchased heat-treated, a 100 per cent. hardness test is made on both ends of each bar on a Brinell or Rockwell testing machine. Tensile test pieces are made from the material and tested to determine physical properties as called for in the drawing or specification. Bars are inspected for seams and cracks, any bars showing imperfections being rejected. Each accepted bar is stamped with specification number and lot number on each end in order to positively identify material from the raw state to the finished product. An exact record is entered

Valve springs are carefully checked as to weight, diameter of wire and spring load at compression and at full height. The valve spring weighing machine, designed by H. W. Roughley, Quality Manager, is used in making these tests.

in a metallurgical log book, giving specification number, lot number, heat number, amount of material received, accepted, rejected, and name of vendor.

Each bar is painted its entire length with the color designated for its particular material specification. This furnishes a convenient method of identification in the stock room and through the Manufacturing Department. Since steel of 23 different chemical analyses enters into the manufacture of Wright aircraft engines, it will be appreciated that positive identification of material is of vital importance.

Inspection of forgings is carried out along lines similar to inspection of bar stock. In addition, however, each forging is pickled for a period of from 30 to 45 mins. in a 50 per cent. solution of hydrochloric acid at a temperature of from 190 to 212 deg. F. After passing through a neutralizing bath, each forging is carefully inspected for any imperfections which may have been brought to light by the pickling process.

Connecting rod forgings are rough machined, heat treated and pickled a second time in a 50 per cent. hot hydrochloric acid solution and again inspected for any small seams which did not show up in the first pickling. Physical tests are then made as follows: The rods are carefully brinelled and if within the hardness limits, one tensile specimen and one double notch izod impact test specimen are made for each five rods treated. In ordinary commercial practice only one tensile test is made for each

Testing the wall tension of the piston ring on a specially constructed gauge which is designed to show contact along the entire circumference of the ring. Scale shows the tension of the steel.

furnace charge, which usually comprises in the neighborhood of 150 rods. After rods are completely machined and polished, they are etched for a period of four minutes in a 20 per cent. nitric-80 per cent. alcohol solution and given a final inspection under a strong magnifying glass. At the same time, a final check for hardness is made in order to eliminate the possibility of incorporating an unheat-treated rod in an engine.

Rocker arm forgings are ground to remove flash and rough-finished all over. They are then heat-treated and all of the scale and surface imperfections of any nature are removed by scratch-brushing and sand-blasting. This is a very difficult operation to perform, owing to the fact that the rocker is of the "I"-beam section type. Rockers are then pickled in the same manner as connecting rod forgings, after which they are inspected for any imperfections and given a 100 per cent. hardness test before being machine finished and finally inspected for imperfections on the finished surfaces.

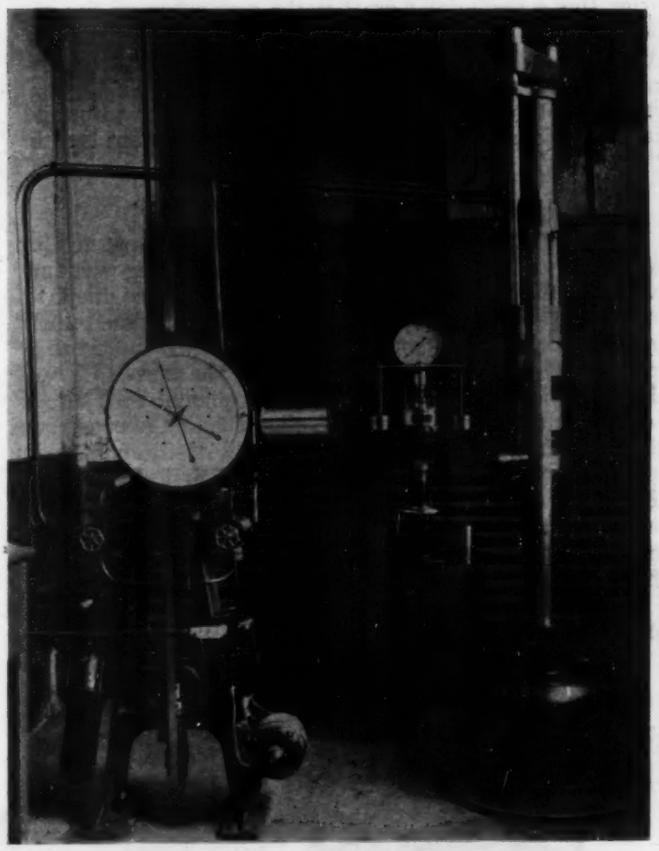
Piston pin stock is rough turned on the outside daimeter, bored out, cut off, heat-treated, sand-blasted, checked for hardness, pickled and carefully examined for seams. After pins have been finished by grinding they are again pickled in hot acid solution for several minutes, the slightest imperfection being sufficient cause for rejection. Pins are then lapped to a high grade finish on a production lapping machine.

Numerous small parts having a hardness above 350 Brinell are first machined from annealed bar stock, then heat-treated, and finally given a 100 per cent. test for hardness, a representative number of tests being made to insure proper heat-treatment. This procedure applies alike to gears, push rod ball ends, washers, special studs, etc.

Connecting rod bolts for Wright engines are classified along with crankshafts and connecting rods and are made of steel with identical specifications, requiring tensile and impact testing. In order to insure material for these bolts being free from the slightest imperfection, they are machined to within 1/32 of finished size and put through a pickling process and inspected under a microscope.

Valve springs, which ordinarily appear to be of secondary consideration, in Wright engines receive a very careful inspection as to diameter of wire and careful check for spring load at proper compression height and also at solid height. In order to make accurate check of this, it was necessary for the Wright Company to build a special spring weighing machine.

Piston rings might also appear of relative unimportance as long as their width and diameter check with blueprint. As a matter of fact, however, the piston ring is one of the most important internal parts of an aircraft engine. Rings must be perfectly round and have at least 95 per cent. bearing against the cylinder wall when installed on a piston assembly. To test this condition, a specially constructed light testing gauge is used which should show contact throughout the entire circumference. The wall pressure is also of major importance and in order to accurately check this condition, it was necessary to provide an attachment to be used in connection with a sensitive scale.



In order to test the tensile strength of steel used in the Wright engines, the metal is placed in an Amsler Hydraulic Testing Machine in which a tremendous force literally tears the specimens apart. A piece of steel—coming up to Wright specifications—will stretch as far as .35" on a 2" specimen, or about 17½ per cent. before the breaking point is reached. The exact amount of force required to tear the metal apart is registered on the dial at the left.

All piston rings for Wright engines are inspected 100 per cent. for dimensions, weighed for wall tension which should range from 8 to 11 pounds, and tested in light

(*Continued on page* 296)

The Berliner Monoplane

Three Place, Open Cockpit, High Wing Monoplane Powered With an OX-5 Engine Has a Top Speed of 105 M. P. H.

By Frederick R. Neely

DOWN in Virginia, proceeding along on an unostentatious program and at a conservative pace, is the Berliner Aircraft Factory, at Alexandria, which is in production on a sturdy two-passenger and pilot dual control OX-5 monoplane bearing the Department of Commerce approved type certificate No. 39.

Embodying no radical departures from the tried and true, this soundly-built craft is the realization of the objective of its designer and builder—simplicity. Henry A. Berliner, of Washington, D. C., leader of commercial aeronautical activities in and about the National Capital, is the creator of this craft which is intended to withstand in every detail the brutal treatment given an airplane in "hop" work.

Short Space Between Longerons

An outstanding feature of the fuselage construction, which is of chrome molybdenum steel tubing without wires, is the comparatively short space between the two longersons—14½ in. This distance was determined upon by Mr. Berliner for two reasons: first, their close proximity enables the diagonal members of the truss to be of the same size, thereby minimizing the amount of labor in producing the members, second, they enable the construction of a large square door which enables the passenger to step to the floor of the plane without first stepping on the seat and then sitting down on the dirt and grease he may have carried into the plane. This entrance feature, in Mr. Berliner's opinion, is the only one in existence in this country on open cockpit planes of a production basis.

An added advantage of the close proximity of the longerons is the streamlining facilities. The metal frame work is surrounded with wooden bulkheads and when covered with fabric the general appearance is that of a monocoque fuselage. The clean fuselage emphasizes the value of this experiment.

Mr. Berliner has utilized his longerons to another advantage in locating his steps and hand-grips. These are welded into the steel tubing and project out far enough

Rear quarter view of the Berliner Monoplane

to be of great assistance not only to those desiring to enter or leave the ship, but to the ground crew in handling. Furthermore, together with the grips welded into the metal border forming the wing-tip, they offer an excellent anchorage facility in tieing the plane down on strange fields or at places where hangar space is not available. The strong, hand grips also eliminate the buckling of the fabric. There is a grip near the tail on each side and four steps, two for the pilot and two for the passenger.

Starting at the nose of the plane and working backward to the tail, the observer finds many interesting points about the plane which, while they all may not be original, are, it may be said, perfected and developed. Three types of propellers are offered with the plane, a Hartzell, Hamilton or Paragon Monoid. Attached, of course is

(*Continued on page* 288)

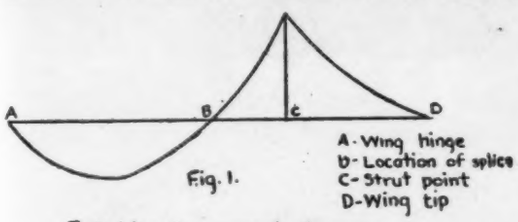
Side view of the Berliner Monoplane (OX-5) manufac tured by the Berliner Aircraft Co., Inc., Alexandria, Va.

How to Splice a Wooden Wing Beam

By C. L. Ofenstein
Chief, Engineering Section, Aeronautics Branch, Department of Commerce

In a recent examination for mechanics' licenses the question was asked, "Where would you splice a broken wooden wing beam?" A number of applicants answered, "I would splice a broken wing beam at the place where it was broken." Since this appears to be the opinion of a number of pilots, mechanics and others, and since the actual construction of the splice is not known by many, this article has been prepared.

Manufacturers of airplanes having difficulty in obtaining wing beams of sufficient length for their purposes



Typical bending moment diagram.

may splice their beams at the proper places and thereby make it easier to obtain suitable material and at the same time effect a great saving in cost.

Wing beams of the conventional biplane or of the braced monoplane break at the outer strut fitting or somewhere between this point and the wing tip. On such beams the maximum bending moment usually occurs at the strut fitting, and the maximum stress just inboard of this point, due to the combination of compressive stresses put in by the flying wires of the biplane or by the wing struts of the braced monoplanes, and the bending moment existing at that point. Another large stress occurs near the middle of the bay, but is usually not as severe as that just inside of the strut point. Between these two points of large stress is a point of zero bending moment, located approximately one-fourth the distance from the strut point to the fuselage or center section fitting. This is the place to locate the splice since the load to be carried is simple compression or tension. Therefore, if the wing beam breaks inside the strut point, at the strut point or anywhere between this and within one foot of the wing tip, it should be cut back to this one-fourth point. If the break is within one foot of the wing tip the splice may be located at the break. Fig. 1 shows a typical bending diagram and gives the location of zero bending moment where the bending moment curve changes from plus to minus. It should be noted that this point is approximately one-fourth of the distance inboard from the strut point.

The splice should be made with a scarf joint having a slope of not less than one to ten. In solid beams and in plywood webs of box beams the plane of the scarf joint should be vertical. In the flanges of box beams, the plane of the scarf should be perpendicular to a vertical plane.

There should not be more than one splice in a wing beam in any bay.

Splices will be divided into two classes:

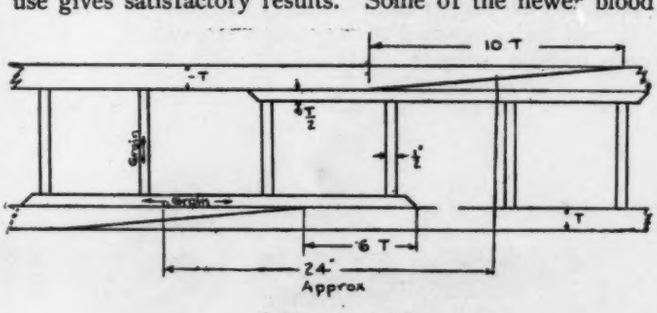
(1) Those made by manufacturers of airplanes who have workmen experienced in the making of glued joints.

(2) Those made by pilots, mechanics or operators, away from recognized airplane factories.

Class 1—Splices Made by Manufacturers

The joint should be glued. Wrapping, screws, nails or bolts should not be used. It has been found that wrapping injures the joint because the tape ordinarily used, even if doped, absorbs enough moisture to deteriorate and weaken the glue. Other fastenings such as screws, nails and bolts do not add strength to the joint, but, in fact, actually weaken it by decreasing the glue area, according to experiments made by the Forts Products Laboratory. A joint, properly made with reliable glue will develop the full strength of the wood.

Casein glue should be used, if obtainable, since its proper use gives satisfactory results. Some of the newer blood



Splice in box beam

Fig. 2.

glues are, it is understood, also giving good results. In any event, the person mixing the glue should follow carefully the directions furnished by the manufacturers of the glue. It should be remembered that the manufacturers of the glue have made hundreds of experiments, many under the direction of the Forest Products Laboratory, in order to obtain the mixing formula furnished with the glue. Another important point to remember is that casein glue should not be used after it has been mixed over

(*Continued on page 286*)

The Boeing Model 81

A New Two Place Training and Light Commercial Biplane Powered With a 135 Hp. Fairchild Caminez Engine

ONE of the most recent airplanes designed to utilize the new types of medium powered air cooled engines is the Boeing Model 81 two-place training and light commercial biplane. This plane is of simple and sturdy construction with safety and economy of production, upkeep and operation as the principal objects in its design. It is similar in construction to the majority of new production planes, having wood wings, a steel welded tube fuselage and split type landing gear.

The first of these planes, powered with a 135 h.p. Fairchild Caminez engine, has been purchased by the Navy for experimental purposes and has recently passed its acceptance tests in a highly satisfactory manner. In these tests its rapid take off and climb strikingly demonstrated the advantage of the large diameter, slow speed propeller made possible by the use of the Caminez engine. Among the other characteristics brought out were the excellent maneuverability in flight and steadiness and ease of control in landing. In a stall the plane settles on an even keel unless forced into a spin by the pilot and then readily recovers when the controls are neutralized. The design is in conformance with both the Navy and Department of Commerce specifications, having a high incidence load factor of 7.6 and a landing factor of 7.

The wings are of conventional wood and fabric construction, with routed spars and reinforced plywood ribs. The latter are similar to those used in the Boeing pursuit planes. Both upper and lower wings have the N-22 airfoil section and are identical in construction except for the fittings. A separate center section serves to house the single 30 gal. fuel tank and simplifies the rigging of the plane. Being a single bay plane with moderate stagger a relatively large gap contributes to the aerodynamic efficiency of the wings and at the same time permits of ready access to both cockpits. The fuselage is narrow and as a result the visibility from both seats is exceptional. The cockpits are roomy and comfortable and a convenient luggage compartment, provided with lock and key, is located within easy reach of the occupant of the front seat.

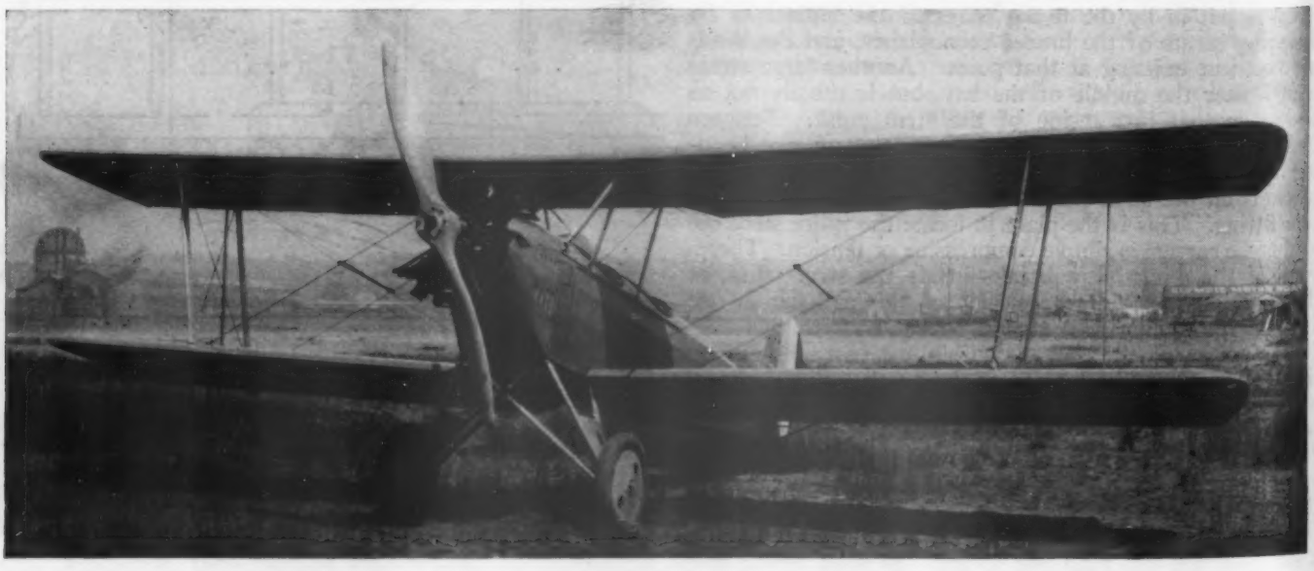
Streamline wires are used in external wing bracing and all interplane struts are of streamline dural tubing, those

Rear quarter view of the Boeing Model 81.

supporting the center section being of greater strength than required to give added safety in case of a crash. Tapered ailerons are mounted on both upper and lower wings and the lateral control has been found to be unusually easy and positive, even at stalling speed.

The fuselage is constructed entirely of welded steel tubing with no wire bracing whatever being employed. Extra heavy fittings are provided for both wheel and float type landing gears. The tail surfaces are also of welded steel tubing covered with fabric with the fin and stabilizer being adjustable on the ground. This has been found

(*Continued on page* 287)



Front quarter view of the Boeing Model 81 *powered with a Fairchild Caminez engine.*

The National Air Tour

Twenty-Two Entries Reach San Francisco With John P. Wood in First Place With a Lead of 1,789 Points

By John T. Nevill
Aviation Representative With the Tour

THE leg between San Antonio and Marfa, the longest jump of the entire route, and regarded as one of the most difficult, was made on scheduled time by all of the 24 planes remaining in the Tour. All of the entrants registered perfect scores for the leg.

Monocoupe, number 26, however, was washed out in Marfa, when Mrs. Omlie, the pilot, ground looped after landing on the army field there. Although the tiny plane turned completely over, doing considerable damage to itself, neither Mrs. Omlie, nor Mrs. Eddie Stinson, who had been her passenger since leaving Fort Worth, were hurt. Mrs. Stinson again became a passenger in the Stinson, number 20, flown by her husband, and Mrs. Omlie made the trip into El Paso in the Ford monoplane, piloted by Frank Hawks.

In El Paso arrangements were made whereby the woman pilot became the pilot of Monocoupe, number 29, flown by Jack Atkinson, Atkinson returning to Marfa by train to await repairs to the damaged plane, after which he plans to catch up with the tour.

The accident was the second mishap in which a plane has been damaged since the tour began in Detroit, June 30, the Ryan Brougham, flown by Cleveland, having been slightly damaged in a forced landing coming into Ft. Worth. Cleveland's damages did not prevent him from taking off at the scheduled time. The two women, Mrs. Omlie and Mrs. Stinson, were highly lauded for their courage in negotiating the mountainous and desert country between San Antonio and Marfa alone in the small, low-powered plane.

The jump between those two stops, the ninth leg of the tour, is 340 mi. in length, and offering few landing places in the event of motor trouble. Countless miles of barren desert country and virtually naked mountains, spotted only with small clumps of brush, lay beneath one for practically the entire distance. The tri-motored Army Fokker, piloted by Lieut. Frank Tyndall, in which AVIATION's representative rode, passed over, or near, but two small villages between San Antonio and Marfa, one of them being Alpine, a small town approximately 20 mi. from Marfa.

Marfa is more than 4,000 ft. high and located in the Davis Mountains. The field there was used extensively during the World War by the Air Service, and the city

(*Continued on page* 282)

Air view of the National Air Tour planes at Mahoney Field, San Diego, Calif.

The Pacer Monoplane

Wright Hispano Powered Four Place Open Cockpit Monoplane has a High Speed of 138 M.P.H. and Lands at 42 M.P.H.

PLANS are now under way to increase production on the Pacer monoplane manufactured by the Pacer Aircraft Corp. of Fords, near Perth Amboy, N. J. So great has been the demand for this highly efficient airplane that the corporation is considering removal of the factory to larger quarters with greatly increased facilities.

The Pacer is a four place, open cockpit, parasol type powered with any air or water cooled engine of more than one hundred horsepower. Production thus far however has been restricted to models equipped with 180 hp. Wright Hispano, or Wright "Whirlwind" engines.

The wing curve, developed by F. R. Seesock, designer of the plane, provides the advantageous combination of slow landing speed and exceptionally rapid take off. In a recent test flight the Hispano model carried a useful load of 1491 lb. and took off with no wind in 20 sec. During the test the total weight of the plane was 2883 lb. and the climb 1000 f.p.m. Under normal conditions, with a useful load of 1200 lb., the climbing rate of the Hispano model is 1500 f.p.m. and that of the Whirlwind type 1650 f.p.m. The landing speed ranges from 42 to 46 m.h.p. depending upon the load.

A high speed of 138 m.h.p. has been attained by the Hispano model and 147 m.h.p. by the Whirlwind equipped planes. The cruising speeds for the two types are 110 and 120 m.h.p. respectively.

In design the plane is of conventional type characterized by simplicity and ruggedness in construction. Wherever possible single units are made to serve dual purposes and nothing providing for increased strength and airworthiness has been omitted. The mean factor of safety throughout is 8.9.

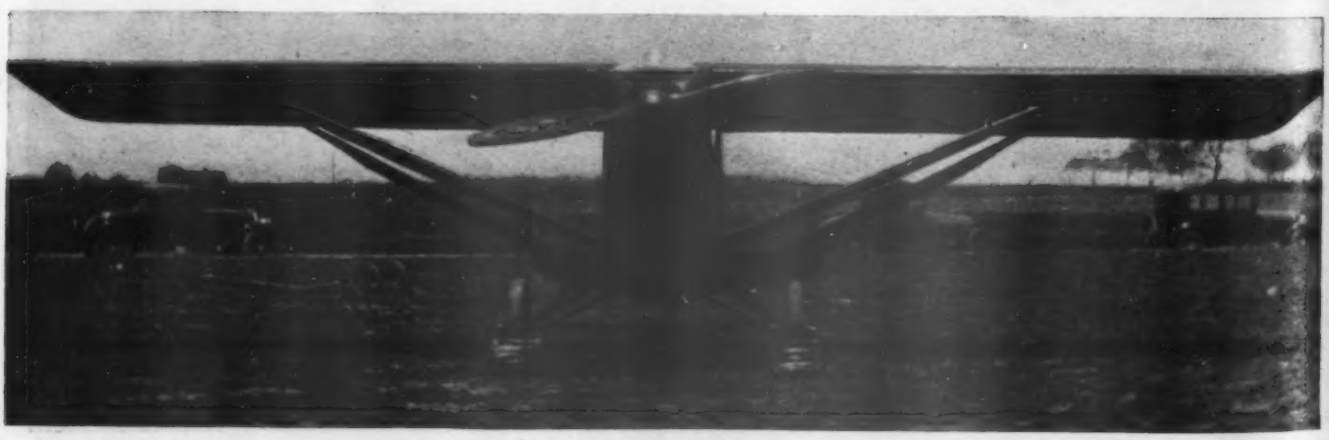
While the plane may be put to a variety of uses it is particularly well adapted to instruction work because of the novel dual control arrangement in the after cockpit. A single control stick is located in the center between the two occupants and, being forked near the top, is within reach of both. Two sets of rudder pedals are provided and may be adjusted to meet the demands of persons of different stature. There are throttle controls on either side of the cockpit. A handle protruding from under the seat and actuating a push pull rod and bell crank provides adjustment of the stabilizer while in flight. The tail surfaces are controlled internally by a system of bell cranks and cables. All instruments required by the Department of Commerce are furnished and mounted on the instrument board in the front of the cockpit.

Front quarter view of the Pacer Monoplane powered with a Hisso engine

The forward or passengers' cockpit is directly under the center section and is entered through a wide door streamlined into the cowling on the left side. A smaller door gives access to the space under the seat which is used for a baggage compartment. This door is hinged to the lower longeron and supports a folding ladder which falls into position when the door is opened. In production the ladders are made of short waste pieces of steel tubing from the fuselage construction. A compartment behind the dashboard in the front cockpit is provided for helmets and valuables belonging to passengers.

In conformance with the usual practice in new pro-

(*Continued on page* 284)



Front view of the Hisso powered Pacer Monoplane manufactured by the Pacer Aircraft Corp., Perth Amboy, N. J.

The Fowler Variable Area Wing

By Harland D. Fowler, A.E.*

IMPROVED efficiency of the conventional airplane is now largely a matter of refinement and perfection of design. Power plants and structural process still present further improvements tending towards greater dependability and economy. Airfoil development has been extensive but well defined. The influence of area, camber, angle of attack and aspect ratio are well known, but taken individual airplane performance can be very limitedly influenced by these variations. Only through their combined and simultaneous action can any material gain be obtained and the resulting improvement must be sufficient great to justify a mechanism required to bring about this combination. The subject has presented a very difficult problem primarily because of structural and mechanical difficulties.

Purpose

The principal of utilizing the chord of a wing by further extending it rearwardly, has been persistently advocated by the author for over twelve years, during which time extensive tests, designs and constructions have been made. The simultaneous change in area, camber and angle of incidence, together with other valuable features are patented.

The present development and the results of numerous flights has more than confirmed the inventor's contention. It can now be considered beyond the experimental stage and available for practical application.

It is an economic loss to be compelled to carry along the present convention wing surfaces when in full flight because of its most important function to permit low take-off or landing speed occupying but a few minutes compared with hours of flying. The Fowler Wing is fully extended for taking off and when at a reasonable altitude it is drawn in, thus reducing air resistance and increasing the speed. For landing it is extended while flying and lands in the usual manner but with a lower angle of attack of the land plane or the seaplane, a very valuable asset for the latter.

Construction

The normal wing is constructed and braced according to recognized practice, in which the main beams and ribs form the basic structure. It is absolutely rigid. Back of the rear spar, a recess is provided on the under side of the trailing surface for the reception of a small auxiliary airfoil, which when inclosed for normal flying position presents a high speed airfoil of a perfectly smooth contour. As the auxiliary airfoil is extended rearwardly, its angle of incidence increases until a positive stop determines its true position. The final setting and shape of auxiliary airfoil is determined by the airfoil used for the normal wing. When fully extended all structural and moving parts are open to inspection. There is nothing

(*Continued on page* 285)

*Chief Engineer, Miller Corporation New Brunswick, N. J.

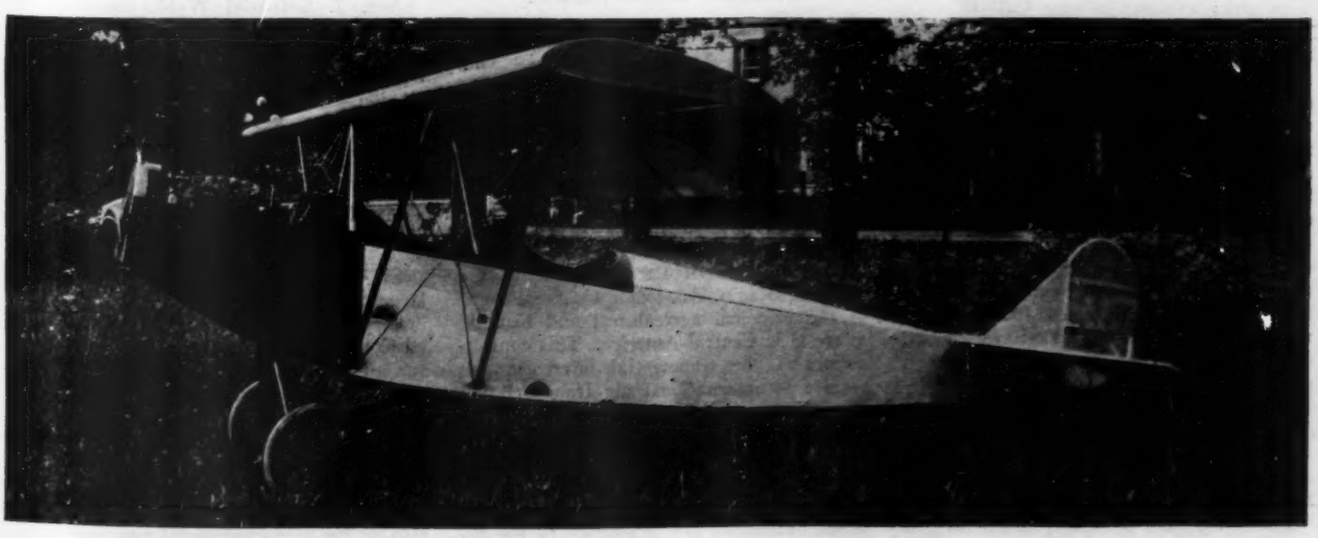


Fig. 3. ***Side view of a JN-4 fuselage fitted with a Fowler wing with the auxiliary wing in an extended position.***

P. A. A. to Operate Great U. S.-Canal Zone Air Line

Service to Start From Key West Jan. 1 with 31 Planes; Fokker F-10's Ordered

NEW YORK, N. Y.—The United States will have the largest system of international passenger and mail airways in the world in operation by January 1, 1929, using a fleet of 31 tri-motored passenger planes, and financed by one of the most influential groups of Wall Street capitalists. This was made possible by the Post Office Department awarding to the Pan American Airways of New York the contract for carrying mail by air from Key West to the Panama Canal Zone.

Pan American Airways is now operating the United States and Cuban mail and passenger route between Key West and Havana, and a Cuban service between Havana and Santiago de Cuba. On September 1 a new Miami-Key West-Havana route will go into operation and on January 1, 1929, the Key West-Colon route will be inaugurated.

Funds for the operation of the Pan American Airways are being advanced by the Aviation Corporation of the Americas, a Delaware corporation, which is sole owner of its entire capital stock. One hundred per cent. of this stock is owned by American citizens, many of them being prominently identified with important companies in the American aviation industry.

Operating Fokker Transports

Pan American Airways is now operating three tri-motored Fokker transport monoplanes powered with Whirlwind engines, also two twin-engined Sikorsky amphibians. By January 1, 1929, Pan American Airways will have aircraft equipment costing more than $2,000,000.

An order has been placed with the Fokker Aircraft Corp. of America for six of the new Super Fokker F-10 tri-motors with a capacity of 14 people. These planes are now under construction at the Fokker plant in Wheeling, W. Va., and the order calls for delivery of three in October and the balance during the month of November. This order amounts to over $500,000.

In cooperation with three large American aircraft manufacturers the Pan American Airways is now developing planes of even greater size and power than the six tri-motors already contracted for and expect to have 20 of these new planes within the next six months. This latter order calls for more than $1,500,000 worth of equipment.

Pan American Airways holds an efficient record for operations on a mail-carrying route. In eight months operations the planes have maintained 100 per cent. regularity in schedule and have carried 216,745 lbs. of mail. There were 519 trips made between Key West and Havana during the eight months and 57,000 mi. flown in 668.33 hr. Nine hundred sixty-six passengers were carried. The total payload capacity operated in the eight months was 778,500 lbs.

Four men have been very active in this newest development in American aviation. They are Richard F. Hoyt, chairman of the board of Wright Aeronautic Corp. of Paterson, N. J., the Pan American Airways of New York, and the Keystone Aircraft Corp. of Bristol, Pa., George Mixter of Stone and Webster, Inc., Cornelius Vanderbilt Whitney, and J. T. Trippe, president of the Pan American Airways, Inc.

Favorable Routes Secured

In commenting on the operations of the Pan American Airways, Mr. Trippe said. "Our company has already secured favorable operating routes in Cuba, Mexico, British Honduras and Nicaragua. Negotiations are well advanced in Honduras and Costa Rica. We have close working arrangements with the United Fruit Co., with Standard Steamship Co., Vaccaro Brothers, the Radio Corp. of America, the International Railways of Central America, the Tropical Radio Telegraph Co., and some of the principal agricultural and banking interests in Central America. This consolidation of the commercial interests with respect to international air transportation allows us to operate an air transport system of maximum efficiency from Key West, Fla., through to the Canal Zone."

"In the map that we have prepared," said Mr. Trippe, "the lines indicated as projected extensions are extensions to the international mail line which the United States Government contemplates and has the right under existing contracts with us to extend under these contracts by giving us notification."

Mr. Trippe pointed out that it will be possible to fly from Miami to Colon in two and a half days with overnight stops at Merida in Mexico and Managua in Nicaragua, the total flying time being 23 hr. This will be a daily air service as compared to a weekly steamship service which takes five days to reach Colon from Galveston, Tex.

The officers of the Pan American Airways, Inc., are: Richard F. Hoyt, chairman of the board; J. T. Trippe, president; George Mixter, vice president; Robert G. Thach, secretary; Robert W. Atkins, treasurer; Elihu Root, Jr., and R. G. Thach, counsel.

The Board of Directors of the Pan American Airways includes Richard F. Hoyt of Hayden, Stone and Company, chairman; S. Sloan Colt of Farmers Loan and Trust Co.; C. F. Whitney, director of the Guaranty Trust Co.; John A. Hambleton, vice president of Hambleton and Company; J. T. Trippe, president of Pan American Airways, Inc., George Mixter of Stone and Webster, Inc., and R. K. Bevier of Bevier and Company.

To Make Glider Flights in Mass.

Provincetown, Mass—J. C. Penney, Jr., son of the chain store operator, will sponsor tests of engineless aircraft and gliding machines soon to be made at Corn Hill near Wellfleet. Tests will be made by the German gliding experts, Dr. Paul Laubenthal, Capt. Paul Roehre, and Peter Hessellbach.

Those actively connected with the tests had previously considered making them either at Detroit or at Mineola, L. I., but finally decided in favor of Corn Hill, 10 mi. from Provincetown.

N. Y. Police on Watch for Air Act Violators

ALBANY, N. Y.—A check up of all planes and pilots in New York State to determine whether the Webb-Shonk Aviation Act, which became a law at the last session of the Legislature, is being met, will begin at once. The investigation will be conducted by the State Police.

The Webb-Shonk Act requires all pilots operating in New York State to hold Federal licenses. It also requires that every plane used in the State shall be registered in accordance with Federal regulations. License certificates must be shown on demand to any passenger, peace officer, or person in charge of any airport or landing field. Violations of the law are punishable by $100 fines, imprisonment for not more than 90 days, or both.

Sen. J. Griswold Webb, chairman of the Joint Legislative Committee on Aviation, Maj. John A. Warner, superintendent of State Police, and Capt. George P. Dutton, deputy superintendent, recently completed all details for enforcing the law.

Boeing Co. Awards Engine Oil Contract

SEATTLE, WASH.,—Said to be the largest deal of its kind in American flying history, the Boeing Airplane Co. has awarded to the Utah Oil Refining Co. a contract for all the engine oil required by the Pacific Air Transport and the Boeing Air Transport. A value of between $12,000 and $14,000 is represented in the contract, covering approximately 25,000 gallons. The oil will be used on the passenger and mail planes on the Pacific Coast run and also on the transcontinental run from San Francisco to Chicago.

Work is Started on Spartan Plant

Austin Company of Cleveland Building New Tulsa, Okla., Aircraft Factory

TULSA, OKLA.—Construction work has started on the new plant for the Spartan Aircraft Co., Inc., at Tulsa, Okla. This new plant, one of the largest airplane factories in the southwest, will be housed in two units of one story construction on a large site alongside the St. Louis & San Francisco Railroad.

The initial units of the new Spartan plant represent a $500,000 investment, including the 20 acre tract of land upon which the plant is located.

The main building which will be for manufacturing and assembling planes is 116 ft. wide and 340 ft. long. There are three aisles running the entire length, a center aisle 48 ft. wide with a clear span and overhead monitor of the same width, and two side aisles each 34 ft. wide. Clearance under the trusses in the main aisle is 18 ft., as well as under the beams in the side aisle.

Light and Ventilation Good

Exceptionally good daylighting and abundant ventilation will be provided through the use of steel continuous in the side walls and in the high monitor section.

A wide loading dock extends the entire length of the main building to receive incoming shipments principally, since outgoing shipments are complete airplanes with flyaway delivery.

Offices and engineering department are located in the street end of the main building and in the mezzanine section of the monitor 48 x 20 ft. over the first bay.

The second plant unit is the dope building. It is 0 ft. wide by 80 ft. long, also of steel frame construction. It has a pitched roof of an interior clear span of 30 ft. Rotary ventilators supplement the continuous steel sash in the side walls as agencies for removing fumes from this building. All lacquering, and "doping" will be done in this building which is located 50 ft. from the rear end of the main building.

Tow Planes to Field

Finished airplanes are towed by motor truck a short distance down Sheridan Road, the well paved street upon which the Spartan plant is located, to the company's flying field, where final testing and flyaway deliveries are made.

The new Spartan plant was designed by the Austin Company with head office in Cleveland, who specialize in the design and construction of aircraft manufacturing plants, hangars and complete airports.

The entire project will be completed about September 15th, based on the Austin Company's construction schedule.

Air Associates, Inc., Adds Barlow to Staff

NEW YORK, N. Y.—Air Associates, Inc., of this city announces the addition of F. Briggs Barlow to the company's field force. This, the concern explains, is in keeping with the promise of the company to the trade to augment service facilities as fast as conditions warrant.

Barlow will travel throughout the eastern states to promote the numerous lines Air Associates handles, and co-operate with all airplane operators, large and small, in furthering the service activities.

Barlow served as second lieutenant with the Royal Flying Corps during the war. His most recent flying experience was his connection as operations manager of a commercial company in Western New York.

Air Associates' increasing list of customers includes such operators as Curtiss Flying Service, Albany Air Service, Brooklyn Aero Club, Aero Club of Chicago, Elmira Airport Corp., Fairchild Airplane Manufacturing Corp., Municipal Airport of Philadelphia, International Aircraft Corp., Roger W. Kahn, and Chas. A. Levine.

To Observe Action of Pacific Air Currents

OAKLAND, CALIF.—Plans for a daily check of the upper air currents of the Pacific ocean, to be carried on by masters of vessels at sea, are being worked out by Captain W. B. Voortmeyer, aerial navigation authority, who plotted the Oakland-to-Sydney course of the "Southern Cross." Captain Voortmeyer believes that the tendency of air currents over the Pacific may be charted for aviators, just as ocean currents are charted for mariners.

He proposes to have ship captains make observations twice daily with balloons such as are used by the weather bureau. At the end of a year's time the numerous records can be compiled and interpreted for navigators on the transoceanic air lines of the future, he believes.

The federal weather bureau has approved his plan and Captain Voortmeyer at present is consulting with steamship concerns to obtain their cooperation.

Parks Planes Total 25

ST. LOUIS, MO.—Training planes at the Parks Air College, Parks Airport, now total 25, it is reported, with the acquisition of a new Stinson Detroiter powered with a Whirlwind and carrying dual controls, and four new Travel Airs. The Stinson plane will be used for giving students their final time before graduation.

Curtiss Testing New Engine

GARDEN CITY, L. I., N. Y.—Tests on a new air cooled engine are now being made here by the Curtiss Aeroplane & Motor Co., Inc. The new power plant, installed for trials in a Curtiss Robin plane, is a six cylinder, air cooled, radial engine developing 170 hp.

West to Have New Air-Rail Service

Line Will Connect Chicago and Pacific Coast Via Twin City

CHICAGO, ILL.—Arrangements have been completed for another new combination air-rail route from Chicago to the Pacific coast by way of Minneapolis and St. Paul, it was announced here this week. Operations are expected to start about August 15. Transportation agencies concerned include the Northwest Airways, and the Transcontinental Air Transport Company, the Chicago, Milwaukee, St. Paul & Pacific, the Great Northern, Northern Pacific and the Burlington railroads.

Passengers will be flown 350 miles from Chicago to St. Paul, and there they will board trains for the coast. Journeying eastward they will leave the trains at St. Paul and proceed by plane to Chicago. One day will be cut from the running time to the Pacific over this route. Later it is anticipated that arrangements will be perfected for a further airplane hop between points somewhere west of the Twin Cities.

T. A. T. Supervision

The announcement came from the offices of Col. Paul Henderson, general manager of the Transcontinental Air Transport, after a conference attended by Col. L. H. Britten of St. Paul, vice president and general manager of the Northwest Airways, operators of mail planes between Chicago and the Twin Cities and by railroad officials. Northwest Airways is to provide planes and pilots but operations will be supervised by the recently organized Transcontinental Air Transport, on whose technical committee is Col. Charles A. Lindbergh.

Hamilton all-metal cabin monoplanes, powered with Pratt and Whitney Hornet air-cooled engines of 525 H.P. will be used for the air flights. Orders have been placed for two of these, each capable of carrying eight passengers and costing $57,000 apiece. Planes will leave Minneapolis at 8:30 a.m., and St. Paul ten minutes later, and will arrive in Chicago before noon, so that passengers can connect with the New York bound trains of various roads. The northbound plane will leave Chicago at 3 p.m., after important eastern trains have arrived in that city. They will reach St. Paul at 7 p.m.

Stearman Takes New Post

WICHITA, KAN.—Waverly Stearman, chief designer for the Swallow Airplane Co. of Wichita for the past four years, has resigned to accept similar position with the Butler Aircraft Corp. of Kansas City, Mo. The Butler Manufacturing Co. of Kansas City is said to be backing the new airplane concern.

Mamer Patrolling Western Forests

Has Contracted With the Government to Spot Timber Fires

SOPKANE, WASH.—An aerial forest fire patrol service in western Montana and Northern Idaho was inaugurated July 1 by the Mamer Flying Service of this city, a contract having been closed with the United States Forest Service for this work. Two Wright Whirlwind engined planes are being used for the work, a Buhl Airsedan, and a new Stearman three place job. The Buhl Airsedan will also be used for vertical photographic mapping with a Fairchild K-3 camera. An area of about 200 sq. mi. of mountain country in the Salmon River region in Idaho is to be covered. Existing maps of this area are inadequate for forest fire control purposes. About 135 sq. mi. were mapped by photography last season with very encouraging results. The Buhl will also be used in some experiments in the delivery of emergency fire control supplies and equipment to ranger headquarters remotely situated in the mountains and now served only by pack-mule train.

Flint Directs Patrol

The patrol will be under the direction of District Forest Inspector Howard R. Flint for the Forest Service, flying as observer and photographer, and Nick Mamer for the Mamer Flying Service. Lt. J. Rose will pilot one of the planes and Forest Ranger F. J. Post will fly as the second observer. Three of the personnel, Mamer, Flint and Jost, have flown with the forest patrol in three previous seasons when it was conducted in co-operation with the U. S. Army Air Corps.

The Forest Service in the Northern Rocky Mountain District has recently cleared and prepared six new emergency landing fields in rough mountain areas where safe landing chances are few and far between. In all cases the new fields are close to ranger stations where telephone service is available. A project has also been started to mark the names of forest lookout and ranger stations on the roofs of the buildings as an aid to forest patrol and other flyers who carry detailed maps of the forests.

Completing Slate Dirigible

GLENDALE, CALIF.—With flight tests scheduled for sometime early in August, the Slate all metal experimental dirigible now under construction at Glendale, Calif., is rapidly nearing completion.

The great duralumin gas bag was finished some time ago and work is now being concentrated on the completion of the main cabin which will extend along almost the entire length of the under side of the dirigible.

Air Associates, Inc., to Have Avro Avians

CURTISS FIELD, L. I.—Announcement is made by Air Associates, Inc., that the first two of a contract consignment of twenty Avro Avians, all equipped with slotted wings by special arrangement with the Handley-Page corporation of Great Britain, owners of the patents, have arrived at their hangars at Curtiss Field, L. I. The A. V. Roe Co., Ltd., of Manchester, England, will ship two Avians every week.

Considerable interest has been manifested in this country in the development and perfection of a device such as the slotted wing designed to prevent a ship dropping into a tail spin when the stalling speed is reached. Contrary to the popular idea, the slotted wings are not a "fool proof" device. As is generally known throughout the industry, the purpose of the invention is to permit aileron control to be resumed at the stalling speed.

Officials of the Air Associates state that several of the advance purchasers of part of the incoming ships are non-professional fliers who based their orders on the utility of slotted wings on sport ships. A series of tests and demonstrations open to the public will be conducted at Curtiss Field. Performance records and comparisons with ships not furnished with slotted wings will be tabulated and made public.

All twenty avians will be powered by the Cirrus Mark II, 80 hp. air cooled engines and folding wings.

G. J. Higgins Joins Detroit U. Faculty

DETROIT, MICH.—Announcement has been made at the University of Detroit of the addition to the faculty of the College of Engineering of George J. Higgins as Associate Professor of Aeronautical Engineering for 1928.

Mr. Higgins now holds the position of Associate Aeronautical Engineer at the Langley Memorial Laboratory of the National Advisory Committee for Aeronautics. In this position he was in charge of the variable density wind tunnel, model testing and report writing. In addition he supervsed the construction of their new high speed jet wind tunnel and the water tunnel, both of which were the first of their kind to be built.

Expert Checks Compasses

Capt. W. B. Voortmeyer, aerial navigation expert who adjusted the compasses of the transpacific plane "Southern Cross," recently completed checking the compasses on seven Boeing and Pacific Air Transport Co. mail and express planes at the Oakland Municipal Airport.

Law Reduces Stunting

MILWAUKEE, WIS.—The Milwaukee city council has passed the Higgins ordinance which regulates airplane flying in Milwaukee. Under this plan stunt flying will be reduced.

Gates Capital Now $2,000,000

Company Producing New Standard Plane Is Reorganized and Expanded

PATERSON, N. J.—Announcement of the reorganization and expansion of the Gates-Day Aircraft Corp., of Paterson, into a $2,000,000 concern is announced. The company, which is engaged in the manufacture of New Standard airplanes under the direction of Charles Healy Day, who designed and built the original J-1 Standards, previously had a capital structure of $250,000.

Before the new planes were even thoroughly tested, the company had received orders sufficient to keep it at top speed production for six months, according to George Daws, secretary.

The original organizers of the company together with a group of business men of Paterson reorganized the company on a $2,000,000 basis, of which $1,000,000 was underwritten immediately.

Work on the New Standards is being speeded up, and the production will be trebled within three months, according to Mr. Day. The present product of the company is a 5 place, open cockpit esquiplane. Mr. Day said that his corps of engineers and technicians are now engaged in the completion of his design for a small, low powered sport model monoplane.

Inasmuch as the present production occupies all of the factory space at the present location in Paterson, it is probable that construction on a new building will be started very soon.

Taxi Drivers to Learn Flying in Spare Time

SEATTLE, WASH.—Twenty-five Seattle taxicab drivers have organized the Consolidated Airways Co. and are preparing for instruction as air pilots as the first step towards what is looked as an era of airplane taxis. As soon as the company gets its incorporation papers from the state, it plans to buy a plane and hire an instructor. The taxi drivers, members of the company, will receive ground and flying instruction in their off hours.

Wants Aerological Base

MIAMI, FLA.—Data on Miami aviation development and scope is being compiled by A. H. Hermance, city aviation director, for Richard W. Gray, meteorologist in charge of the Miami weather bureau, who will present it to Washington officials with his recommendation that an aerological station be established there to furnish upper air weather data for aviation.

MANUFACTURERS' SPECIFICATIONS ON AMERICAN COMMERCI

THE TABLE BELOW IS BELIEVED TO BE ACCURATE BUT *AVIATION*

This table will appear monthly and corre

MANUFACTURER	Designation	Price of Plane at Factory	Type	No. of Seats	Make of Engine	Total Rated HP.	Make of Propeller	Span	Wing Area (Sq. Ft.)	Length Overall	Height Overall	Weight Empty (Lb.) With Water if Water Cooled Engine is Used	Pay Load (Lb.)	Disposable Load (Lb.)	Normal Gross Weight Loaded (Lb.)	High Speed
Advance Aircraft Co.	Waco 10	$20 5*	OBL	3	R89	125	.....	30' 9"	272	23' 3"	9' 5"	....	....	....	....	..
Advance Aircraft Co.	Waco 10	$2035*	OBL	3	OX5	90	H,Hs	30' 8"	272	23' 3"	9' 5"	1200	760	825	2025	10
Aero-Craft Mfg. Co.	Aero-Coupe	.....	SBL	3	W	110	.....	32'	250	24'	8" 6'	1100	550	100	2100	11
Alexander Aircraft Corp.	Eaglerock	$2,250*	OBL	3	OX5	90	.....	36' 8"	330	24' 11"	9' 11"	....	....	....	2230	10
Alexander Aircraft Corp.	Eaglerock	$2,250*	OBL	3	R89	125	.....	36' 8"	330	24' 11"	9' 11"	....	....	....	2230	11
American Eagle Aircraft Co.	.....	$2885	OBL	3	OX5	90	H, Hs	30'	300	24' 6"	8' 4"	1227	840	830	2057	10
Arkansas Aircraft Corp.	Comm'd-Aire	$3,250	OBL	3	OX5	90	.....	31' 6"	300	24' 6"	8'	1275	....	800	2075	10
Arkansas Aircraft Corp.	Heinkel H.D. 4(	.....	CBL	2	PWw	400	.....	57'	250	39'	14'	....	2500	....	....	14
Atlantic Aircraft Corp.	F-7 & C-2	$44,500	CML	10-12	3-J5	600	H	63' 3"	630	49' 2"	12' 9"	5480	2000	3720	9060	12
Atlantic Aircraft Corp.	Universal	$14,200	CML	5-7	J-5	200	H, Hs	47' 9"	341	33'	8' 9"	2100	1200	1900	4000	11
Atlantic Aircraft Corp.	Super-Univ	$19,340	CML	6-8	P Ww	400	SS	50' 6"	382	36"	8' 11"	2800	1230	2200	5000	14
Atlantic Aircraft Corp.	Fokker F-10	$60,000	CML	14	3-PWw	600	SS	71'2"	728	50' 8"	12' 5"	7200	2640	4950	11500	14
Arrow Aircraft Corp.	Arrow-Sport	$2,257	OBL	2	LB	60	.....	25' 6"	178	19' 2"	6' 11"	524	....	450	974	10
Bach Aircraft Co.	Air Yacht	$31,800	CML	10-12	2-RSg-pww	650	2 Sty, SS	52'	412	36.1	9' 6"	3300	....	3200	6500	15
Bellanca Aircraft Corp.	CH	$14,500	CML	6	J5	200	Hs	46' 4"	273	24 9	8 6	1810	1100	1850	3700	12
Berliner Aircraft Co.	.....	....	OML	3	J5	200	SS	34'	206	25'	8'	1400	....	....	2033	13
Bird Wing Commr. Airplane Co.	No. 6	$2,795	OBL	3	OX5	90	Hs	31' 4"	303	23 6"	8' 7	1236	550	1019	2255	9
Boeing Airplane Co.	40A	.....	SBL	1-5	P Ww	400	H, M	44'2"	545	34'3"	11' 7"	3031	1600	2469	5500	13
Boeing Airplane Co.	B-1D	$15,000	CBF	4	J5	200	.....	39' 8"	466	30' 9"	12'	2412	720	1000	3142	9
Bourdon Aircraft Corp.	Kitty-Hawk	$4,800	OBL	3	R87	96	Hm	28 6"	240	22'2"	7'9"	1150	....	750	1900	10
Breese Aircraft Co.	.....	.....	CML	6	J5	200	SS	41'	260	41	10'6"	155	..	1000	2550	12
Brown-Mercury Aircraft Corp.	C-3	$9,800	CML	3	3-A6	180	Sty	41' 6"	260	25'	.....	1450	600	1500	2950	12
Buhl Aircraft Co.	Airsedan-C5A	$12,500	CBL	5	J5	200	SS	42'	320	28	14'	2072	1000	1628	3700	'2
Buhl Aircraft Co.	Airster	$10,000	OBL	3	J5	200	SS	33' 8"	309	23' 2"	9' 7"	1575	800	1380	2955	12
Cessna Aircraft Co.	3-120	3,575*	CML	3	A	120	H Hs	40'6"	224	23' 8	7 4	1250	480	750	2000	1
Cessna Aircraft Co.	4-125	4,075*	CML	4	R89	125	H, Hs	40'6"	224	23' 8	7 4	1260	760	1030	2280	12
Cessna Aircraft Co.	4-300	4,475*	CML	4	J5	200	H Hs	40'6"	224	23' 8	7 4	1350	800	1070	2420	15
Crawford M. & A M g. Co.	A1	$1,500	OML	2	LR	80	own	30'	150	17' 0"	8'	950	....	450	1400	9
Curtiss-Robertson A'p'ne Mfg. Co.	Robin	.....	CML	3	OX5	90	CR	41'	265	25' 9"	7' 10"	1400	....	700	2100	10
Driggs Aircraft Corp.	Dart II	$1,900	OBL	2	A3	35	Hs	28'	140	19' 6"	6'	450	....	370	820	8
G. Elias & Bros.	M-1	$7,500	OBL	1	L12	400	CR	40'	497	28'	12	2857	1200	2016	4867	12
G. Elias & Bros.	Airmobil	$7,500	OBL	3	L12	400	CR	40'	435	28'	11' 3"	2759	420	1290	4049	14
Fairchild Airplane Mfg. Co.	FC-2W	.....	CML	5	P Ww	400	SS	50'	332	30' 11"	9'	2570	970	830	4600	14
Fairchild Airplane Mfg. Co.	FC-2W sea	.....	CMW	5	P Ww	400	SS	50'	332	33' 4"	12'	2418	1130	2182	5150	13
Fairchild Airplane Mfg. Co.	FC-2 land	.....	CML	5	J5	200	CR	44'	290	30' 11"	9'	2150	845	1456	3650	12
Fairchild Airplane Mfg. Co.	FC-2 sea	.....	CMW	5	J5	200	CR	44'	290	32' 5"	11' 5"	2427	833	1573	4000	11
Federal Aircraft Corp.	CM-1	$12,500	CM	5	J4B	200	We	37' 6"	262	29' 3"	9'	2080	630	1395	3475	12
Gillis Aircraft Corp.	Crusader	.....	CBL	4	R89	125	Hm	33 0	245	23'	9'	....	....	....	2400	11
Hamil on Metalplane Co.	H-19	.....	CML	6	J5	200	H	48'	287	32' 7"	8' 10"	1960	....	2000	3960	12
Hamil on Metalplane Co.	H-21	.....	CML	8	PWw	400	H	54'	392	33' 7"	9'	2685	....	2205	4700	13
Heath Airplane Co.	Parasol	$89	OML	1	H	23	own	23'	94	16' 9"	5' 11"	290	....	225	515	7
International Aircraft Corp.	F-17	$2,750*	OBL	3	OX5	90	H	35'	325	25	9' 6"	1300	400	821	2121	10
International Aircraft Corp.	F-17	$2,900*	OBL	4	J5	200	SS	35'	325	25	.....	1350	400	1239	2589	14
International Aircraft Corp.	F-18	$2,250*	OBL	7	J5	200	SS	37'	360	27' 6"	10' 6"	1550	1000	1843	3393	13
Ireland Aircraft, Inc.	Neptune	$14,600	CMA	5	J5	200	CR	40	350	31' 6"	11' 6"	2250	750	1358	3608	9
Irwin Aircraft Co.	M-T-2	$1,165	OBL	1	179	25	own	20'	105	13' 6"	5' 9"	275	100	300	575	9
Keystone Aircraft Corp.	Pronto	.....	OBL	3	J5	200	.....	39' 11"	365	26' 9"	.....	1975	....	1310	3285	11
Keystone Aircraft Corp.	Pathfinder	.....	CBL	12	3-J5	600	.....	66' 6"	1150	40' 4"	.....	6536	1900	4481	10841	11
Kinner A. & M. Corp.	Airster	$3,350	OBL	2-3	K5	100	S	28' 6"	236	21' 3"	8' 5"	850	330	700	1500	11
Kinner A. & M. Co.	Courier	.....	OML	2	K-	100	SS	35'	21	23'	7'	915	....	550	1465	12
Kreider-Reisner Aircraft, Inc.	Challenger	.....	OBL	3	OX5	90	Hs, H	30' 1"	296	23' 9"	9' 4"	1189	412	811	2000	10
E. M. Laird Airplane Co.	Commercial	.....	OBL	3	J5	200	SS	34'	300	23' 6"	9' 3"	1550	800	....	....	13
Laird Aircraft Co p.	Whippoorwi	.....	CBL	4	J-5	200	.....	36'	351	27	9	1650	....	1000	2650	12
Lincoln Aircraft Co.	L'ncln-Page	.....	OBL	3	OX5	90	.....	32'	300	.....	.....	1200	450	1000	2200	10
Lockhee l Aircraft Co.	Vega	.....	CML	5-7	J5	200	SS We	41'	275	27'5"	8' 6"	1650	1000	1550	3200	13
Lockheed Aircraft Co.	Air Exp.	.....	CML	5-7	P Ww	400	SS	41'	275	27' 5"	8' 6"	1850	1000	1845	3645	16
Loening Aeronau ical Engr. Corp.	Cabin Amphibi	$26,700	CBA	5-7	PWw	400	SS	45'	504	34' 8"	13'2"	3400	1200	2000	5400	12
B. F. Mahoney Aircraft Corp.	Ryan B1	$12,200	CML	5	J5	200	H W	42'	290	27' 5"	9' 10"	1870	800	1430	3300	12
Metal Aircraft Co.	Flamingo GMT6	.....	CML	6-8	PWw	400	SS	48'	354'	30'	9'	2800	....	2050	4850	14
Mono Aircraft Inc.	Monocoupe	$2,675	OML	2	V	70	Hs	30' 6"	124	22'	6' 3"	725	....	500	1225	11
Mohawk Aircraft Corp.	Pinto	$2,375	CML	2	A	60	.....	30'	150	20	6' 3	700	....	475	1175	10
National Airways ystem. Inc.	Air King	$2,395	OBL	3	OX5	90	Hs	34' 1"	310	25' 5	9'	1290	....	800	2090	10
Niles Aircraft Co	Williams	.....	OML	1	Sa	40	.....	28'	108	18	6'6"	440	....	....	....	8
Pheasant Aircraft Co., Inc.	H-10	$2,375	OBL	3	OX5	90	Hs	32' 6"	283	23' 6"	9'	1297	600	785	2082	10
Pitcairn Aviation Inc.	Mailwing	$10,000	OBL	1-3	J5	200	SS	33'	252	22' 10"	8' 10"	1612	600	770	2512	13
Pitcairn Aviation, Inc.	PA-4	.....	OBL	3	OX5	90	Hs	30'	220	21' 10"	8'7"	1165	....	785	1950	10
Prudden-San Diego Airplane Co.	T-M-1	.....	CML	7	3-R89	375	Wd	57'	427	38'	9' 5"	3000	1260	2152	5152	11
Richmond Airways, Inc.	Sea Hawk	.....	OMF	5	C6	160	.....	46'	317	28'	.....	1700	....	1000	2700	9
Sikorsky Mfg. Co.	S-36	.....	OBa	8	2-J5	400	.....	72'	668	34'	12'	4600	....	3000	7600	11
Sikorsky Mfg. Co.	S-37	.....	CBL	18	2P Wh	1000	.....	100'	1049	45' 6"	16' 3"	8000	4060	7000	15000	12
Simplex Aircraft Corp.	Red Arrow	$3,950	CML	2	K5	100	Sty	33' 4"	148	20' 3"	6' 10"	1000	....	600	1600	12
Starling Aircraft Co.	.....	.....	OBL	3	OX5	90	.....	32'	....	23'4"	9 F	1237	....	600	1837	10
Stearman Aircraft Co.	C-2-K	$6,740	OBL	3	R89	125	H, Hs	33'-28'	296	24'	9'	1235	350	865	2150	11
Stearman Aircraft Co.	C-2 B	$8,730	OBL	3	J5	200	H, CR	33'-28'	296	23	9'	1438	400	962	2400	13
Stinson Aircraft Corp.	SB-1	$11,000	CBL	5	J5	200	SS	35' 10"	354	28' 10"	10' 3"	1815	....	1465	3280	11
Stinson Aircraft Corp.	SM-1	$12,500	CML	6	J5	200	SS	45' 10"	292	32'	9'	1970	....	1515	3485	12
Stinson Aircraft Corp.	Junior	.....	CML	3	W	110	Wd	39' 6"	228	26' 1"	7'0"	1450	525	1000	2450	11
Spartan Aircraft Co.	C-3	.....	OBL	3	R89	125	.....	32'		23' 6"	8' 9"	1140	....	800	1940	11
Stout Metal Airplane Co.	4 AT	.....	CML	12	3J5	600	SS	74'	785	49' 10"	12' 8"	6300	....	3800	10000	11
Swallow Airplane Mfg. Co.	Commercial	.....	OBL	3	OX5	90	.....	32'	300	24'	8' 6"	1470	380	730	2200	10
Taylor Bros. Aircraft Co.	Chummy	$3,800	SML	2	K-5	100	.....	34'	175	22'	7'6"	950	100	550	1500	11
Texas Aero Corp.	Temple	.....	OML		J5	200	....	39' 4"	225	25' 10"	8' 3"	....	567	....	2250	..
Thaden Metal Aircraft Co.	T-1	.....	CML	7	P Ww	400	....	53	....	35	11	2900	....	2200	....	..
Thunderbird Aircraft, Inc.	.....	.....	OBL		OX5	90	CR	33	300	25' 6"	.....	1300	....	....	....	11
Travel Air Mfg. Co.	2000	$2,950	OBL		OX5	90	H, Hs	34' 8"	296	24' 2"	8' 9"	1350	350	750	2100	10
Travel Air Mfg. Co.	4000	$9,100	OBL	3	J5	90	H	34' 8"	296	23' 6"	8' 9"	1400	600	1000	2400	13
Travel Air Mfg. Co.	6000	.....	CML	5	J5	200	SS, H	48' 7"	282	30' 6"	9'	2350	1000	1650	4000	12
Travel Air Mfg. Co.	Camines	.....	OBL	3	FC	135	HH, s	34' 8"	296	24'2"	8'9"	1275	400	875	2150	11
Travel Air Mfg. Co.	9000	.....	OBL	3	R89	125	W	34'8"	296	24'2"	8'9"	1250	360	960	2210	10
Wallace Aircraft Co.	Touroplane	$2,500*	CML	3	A	80	Hs	37'	205	23' 6"	7' 6"	850	320	650	1500	9
Whites Aircraft.	Hum. Bird	$2,150	OBL	3	OX5	90	Hs	33' 1"	318	23' 6"	8' 3"	1050	450	850	1900	9
Western Airplane Corp.	King Bird	$2,500	OBL	3	OX5	90	Hs	35'	320	25' 4"	9'	1200	600	800	2000	9
Zenith Aircraft Corp.	Albatross	$35,000	CML	14	3-R89	375	Sty.	90'	1032	50'	12' 6"	4000	5000	7,000	12,000	10

TYPE:

A—Amphibian
B—Biplane
C—Closed
F—Flying boat
L—Landplane
M—Monoplan
O—Open
S—Semi-closed
W—Seaplane

ENGINE: One engine unless stated in italics.

A—Anzani
C6—Curtiss
FC—Fairchild Camines
H—Henderson
I79—Irwin
J5—Wright Whirlwind
K—Kinner
L—Liberty
LB—Le Blond
LR—LeRhone
OX5—Curtiss
P Wh—Pratt & Whitney Hornet
P Ww—Pratt & Whitney Wasp
RS—Ryan Siemens
SR—Super Rhone
Se—Seekely
V—Velie
W—Warner
*—Price without engine

PROPELLER:

CR—Curtiss Reed
H.—Hamilton
Hs—Hartzell
M—Metal
Sty—Story
SS—Standard Steel
W—Wood
We—Westinghouse

ERCIAL AIRPLANES AND SEAPLANES AS COMPILED BY *AVIATION*

ITION DOES NOT ASSUME RESPONSIBILITY FOR THE FIGURES GIVEN

y and corrections and suggestions are invited.

Normal Gross Weight Loaded (Lb.)	Performance With Full Load at Sea Level As Supplied by Manufacturers.						Fuel Capacity in Gallons	Normal Range in Miles	Normal Fuel Consumption at Cruising Speed Gal. Per Hr.	Fuselage Construction	Wing Construction	Are Wings Wired for Lighting?	Type of Control	Brakes	Type of Shock Absorber	Type of Pontoon Provided for	Additional Cost as Seaplane	Dept. of Commerce Type Certificate Number	Performance Figure Guaranteed?	
	High Speed in M.P.H.	Cruising Speed in M.P.H.	Landing Speed in M. P. H.	Climb at Sea Level in F. P.M	Climb to 10'000 in Minutes	Service Ceiling in Feet														
....	..	..	..	..	..	....	37	..	....	Wl-ST	Wd-F	No	SPD	Ex.	H	EFH	$1,100	26	....	Advance—Waco 10
2025	101	95	35	750	29	12,000	37	550	7.5	Wl-ST	Wd-F	No	SPD	Ex.	H	EFH	$1,100	13	No	Advance—Waco *10*
2100	110	100	..	900	..	....	46	460	....	Wl-ST	Wd-F	Yes	SD	....	....	....	....	..	....	Aero-Craft—Coupe
2230	101	87	34	514	..	10,200	46	435	10.3	Wl-ST	Wd-F	....	SCD	....	RC	E	....	7	....	Alexander—Eaglerock
2230	113	85	34	830	..	14,780	46	425	10	Wl-ST	Wd-F	$20	SCD	....	RC	E	....	....	Yes	Alexander—Eaglerock
2057	101	85	30	575	45	12,000	42	425	7.5	Wl-ST	Wd-F	No	SPD	Ex.	RAR	E	$990	17	....	American Eagle
2075	104	..	36	..	..	....	..	400	....	Wl-ST	Wd-F	....	S	....	RC	....	....	..	....	Arkansas—Com'd'aire
....	140	..	54	..	..	....	..	....	....	Wl-ST	Wd-F	....	DeD	....	....	....	....	..	5% N	Arkansas—Heinkel H.D. 40
2060	122	100	55	720	24	12,500	185	580	32	Wl-ST	Wd-P	Yes	DeCD	Yes	RAR	....	....	Apl	....	Atlantic—Fokker F7 & C-2
4000	118	98	48	500	40	11,500	78	600	12	Wl-ST	Wd-P	Yes	SCD	Yes	RC	Met.	$2450	9	....	Atlantic—Fokker Univ.
5000	140	118	42	1000	15	18,000	120	700	20	Wl-ST	Wd-P	Yes	SCD	Yes	RAR	Met.	$3110	Apl	5%	Atlantic—Super Univ.
2500	148	125	55	1400	10	18,000	286	580	60	Wl-ST	Wd-P	Yes	DeCD	Yes	RC	....	....	..	....	Atlantic—Fokker F-10
974	105	..	36	680	..	15,200	..	..	..	Wl-ST	Wd-F	....	S	....	RC	....	....	..	....	Arrow—Sport
4500	150	110	45	1100	12	18,000	170	500	32	Wd-P	Wd-F	Yes	DeCD	S-B	Hy-C	....	....	....	Yes	Bach—Air Yacht
2700	128	110	46	850	..	13,000	85	800	10	Wl-ST	Wd-F	Yes	SCD	....	RC	D	....	....	....	Bellanca—CH
2033	136	110	44	..	..	....	44	450	10	Wl-ST	Wd-F	..	D	Yes	....	....	....	39	....	Berliner
4255	90	80	30	460	80	10,000	35	325	9	Wl-ST	Wd-F	Yes	SC PD	ex.	RC	E	$990	Apl	Yes	Bird Wing—No. 6
4500	130	..	54	770	19	15,000	100	..	..	Wl-ST	Wd-F	Yes	S	Yes	O	....	....	2	....	Boeing—*40A*
3142	95	..	52	..	..	12,000	40	..	....	Wd	Wd-F	Yes	DeD	....	....	....	....	23	....	Boeing—B-1D
1900	100	95	38	..	..	15,000	38	..	6.5	Wl-ST	Wd-F	..	SPD	....	RC	....	....	..	....	Bourdon Kitty Hawk
2550	130	115	43	900	..	15,500	80	550	9.5	Wl-ST	Wd-F	....	....	....	RC	....	....	..	....	Breese
2950	120	100	40	600	35	14,000	78	650	12	Wl-ST	Wd-F	Yes	SC	....	Grs.	No	....	Apl	Yes	Brown-Mercury—C-3
3700	120	95	50	700	45	13,500	70	..	15	Wl-ST	Wd-F	Yes	SC	Yes	RD	Met	$2,500	33	....	Buhl Airsedan
2955	125	100	45	1150	10	18,000	64	500	12	Wl-ST	Wd-F	Yes	S	Yes	RD	Met.	$2,500	1	Yes	Buhl Airster
2000	120	110	45	1000	..	....	42	400	10	Wl-ST	Wd-PF	Ex.	SPD	E	RAR	....	....	Apl	5%	Cessna Aircraft Co.
2280	125	115	45	1000	..	....	42	400	10	Wl-ST	Wd-PF	Ex.	SPD	E	RAR	....	....	Apl	5%	Cessna Aircraft Co.
3420	150	125	45	1400	..	....	42	400	12	Wl-ST	Wd-PF	Ex.	SPD	Ex	RAR	....	....	Apl	5%	Cessna Aircraft Co.
1400	95	64	47	..	..	13,000	40	500	6	ST-Wd	Wd-F	No	D	....	RC	....	....	No	....	Crawford—*A1*
2100	100	85	40	500	..	11,000	50	785	....	Wl-ST	Wd-F	....	SD	....	RAR	....	....	40	....	Curtiss—Robin
820	85	75	40	560	..	15,000	15	375	3	Wl-ST	Wd-FD	Yes	....	No	RC	None	....	15	....	Driggs—Dart II
4867	126	105	45	1250	19	15,000	100	525	20	Wl-ST D	Wd-F	Yes	C	No	TR	....	....	No	....	G. Elias & Bros.—MF
4049	146	125	45	1050	10	16,000	100	625	20	Wl-ST	Wd-F	Yes	SC	No	RC	....	....	..	....	Elias—Airmobile
4600	140	120	55	580	12	18,000	160	1050	18	Wl-ST	Wd-F	Yes	S-CP	Yes	Hy	F	....	20	....	Fairchild—FC-2W land
5150	130	110	58	420	21	12,000	160	950	18	Wl-ST	Wd-F	Yes	S-CP	....	....	F	....	20	....	Fairchild—FC-2W sea
3650	122	103	53	580	27	13,100	110	710	15.5	Wl-ST	Wd-F	Yes	S-CP	Yes	Hy	F	....	10	....	Fairchild—FC- land
4000	112	..	53	1250	36	12,700	110	650	15.5	Wl-ST	Wd-F	Yes	S-CP	....	....	F	....	10	....	Fairchil.—FC-2 sea
3475	125	105	40	..	..	....	84	750	10	Wl-ST	Wd-ST	Yes	SC	Yes	Arl	....	....	..	....	Federal Aircraft—CM-1
2400	110	90	45	600	..	11,500	45	420	....	Wl-ST	Wd-F	Yes	DeD	B	O	....	....	..	....	Gillis—Crusader
3960	120	100	50	750	..	14,000	80	650	12	D-cor.	D-cor.	Yes	SPD	Yes	O	H	$2500	..	5%	Hamilton—H-19
4700	135	115	55	1250	..	18,000	150	750	21	D-cor.	D-cor.	Yes	SPD	Yes	O	H	$3000	..	5%	Hamilton—H-21
515	70	65	32	200	..	....	3.3	120	....	R-ST	Wd-F	No	SC	No	RC	....	....	..	....	Heath—Parasol
2121	100	87	35	600	..	10,500	40	450	....	Wd	....	....	S	Ex.	O	....	....	35	5%	International—F-*17*
2589	140	120	35	1000	..	16,000	66	700	....	Wd	Wd-F	....	S	Ex.	O	....	....	Apl	5%	International—F-*17*
3393	130	110	40	800	..	15,000	106	1000	....	Wd	Wd-F	....	S	Ex.	O	....	....	Apl	5%	International—F-*18*
3608	95	85	46	650	35	11,000	65	500	12	ST-D	Wd-F	Yes	DeD	No	O	....	....	Apl	5%	Ireland—Neptune
575	90	75	28	400	65	12,000	8	300	1.7	Wd	Wd-F	Yes	SC	....	RC	W	$175	..	6%	Irwin—M-T-*2*
3286	112	..	..	800	..	14,000	60	..	....	Wl-ST	Wd-F	....	....	....	....	....	....	..	....	Keystone—Pronto
0841	112	..	57	570	..	....	..	500	....	Wl-ST	Wd-F	....	....	....	....	....	....	..	....	Keystone—Pathfinder
1500	110	90	35	750	45	14,000	27	400	6	Wd	Wd-F	No	SD	No	Grs.	....	....	Apl	Yes	Kinner—Airster
1465	120	110	35	900	..	20,000	..	800	7	Wl-ST	Wd-F	....	....	S	Grs.	....	....	..	....	Kinner—Courier
2000	102	..	39	548	..	12,000	..	400	....	Wl-ST	Wd-F	Ex	SD	No	RC	EH	$1,000	19	5% N	Kreider-Reisner—Challenger
....	130	10	40	1350	10	....	80	600	....	DT, S	Wd-F	..	SPA	....	....	....	....	..	....	E. M. Laird—Commercial
2650	125	105	40	..	15	....	..	..	....	Wl-ST	Wd-F	Yes	DeD.	Std	RC	....	....	..	....	Laird—Whippoorwill
2200	100	..	35	600	..	....	42	500	....	Wl-ST	Wd-F	....	....	....	....	....	....	28	....	Lincoln—Page
3200	135	110	50	1000	16	15,900	100	700	10	W-mon	Wd-P	Yes	SC	H	RHy	E	....	Apl	5%	Lockheed—Vega
3645	167	135	55	1460	10	17,250	100	1000	18	W-mon	Wd-P	Yes	SC	H	RHy	....	....	Apl	5%	Lockheed—Air Express
5400	120	..	50	..	..	14,000	140	650	....	Wd-D	Wd-F	Yes	DeC	Ex.	RC	....	....	34	....	Loening—Amphibian
3300	126	108	49	1000	..	16,000	83	700	10-11	Wl-ST	Wd-F	....	SC	S	Grs	E	....	25	Yes	B. F. Mahoney—Ryan B/
4850	140	120	48	1375	..	....	150	1000	18	Wl-ST D	D	Yes	DeDC	S	Arl	....	....	..	....	Metal—Flamingo
1225	110	90	35	800	..	12,000	..	360	20	Wl-ST	Wd-F	Yes	S	Std	Arl	....	....	..	....	Mohawk—Pinto
1175	102	87	35	700	35	....	25	4 0	4	Wl-ST	Wd-F	Yes	SP	....	RC	....	....	22	Yes	Mono Aircraft—Monocoupe
2090	103	85	35	600	..	15,000	35	396	8	Wl-ST	Wd-F	No	S	No	RC	....	....	29	....	National Airways—Air King
....	85	..	30	925	..	....	..	360	....	Wl-ST	Wd F	..	SC	Std	....	....	....	Apl	....	Niles—Williams
2082	100	90	35	500	25	12,500	38	400	9	Wl-ST	Wd-F	Ex.	SPD	Ex.	RC	EH	$1,000	36	....	Pheasant—H*10*
2512	136	105	45	1600	..	11,000	60	600	....	Wl-ST	Wd-F	Yes	S	Yes	Arl	....	$900	18	5%	Pitcairn—Mailwing
1950	101	82	45	..	..	....	35	400	....	Wl-ST	Wd-F	....	S	....	Grs	....	....	..	Yes	Pitcairn—PA-*4*
5152	110	95	52	500	25	11,000	110	400	21	D-cor.	D-cor.	....	....	B	Grs.	....	....	..	....	Prudden-San Diego—T-M-1
2700	95	..	45	..	..	....	42	..	....	Wd-D	Wd-F	....	DeCP	....	....	....	....	..	....	Richmond Airways—Sea Hawk
7600	115	100	51	400	..	11,000	326	1000	25	Wd-D	DOR, B	....	De D	....	RDO	....	....	..	5%	Sikorsky—S36
5000	122	112	58	650	..	15,000	370	790	50	DOR, B	DOR, B	....	De D	Hy	RDO	....	....	Apl	5%	Sikorsky—S37
1600	125	110	40	1000	17	16,000	..	1250	5.5	Wl-ST	Wd-F	Yes	S	....	....	....	....	..	5%	Simplex—Red Arrow
1837	104	95	30	..	15,000	....	40	400	....	Wl-ST	Wd-F	....	SD	....	HyC	....	....	..	....	Starling
2150	110	90	38	625	..	12,000	50	500	7	Wl-ST	Wd-F	Yes	PC	St.	RHy	D	....	Apl	5%	Stearman—C-2-K
2400	130	110	41	1000	..	18,000	65	620	11.5	Wl-ST	Wd-F	Yes	PC	St.	RHy	D	$1,200	Apl	5%	Stearman—C-2-B
3280	118	100	46	600	..	13,500	70	600	11.5	Wl-ST	Wd-F	Yes	DeD	St.	....	M	$2,500	24	5%	Stinson—SB-*1*
3485	128	105	55	750	..	14,000	90	700	11 5	Wl-ST	Wd-F	Yes	DeD	St.	RC	M	$2,500	16	5%	Stinson—SM-*1*
2450	110	95	45	..	..	....	40	600	....	Wl- T	Wd-F	Yes	D	Yes	Hy	....	....	..	....	Stinson—Junior
1940	115	..	37	100	..	....	44	600	....	Wl-ST	Wd-F	....	S	....	RC	....	....	..	....	Spartan—C-3
10000	114	100	59	..	..	14,000	235	540	9	D-cor.	D-cor.	Yes	DeD	St	O	....	....	..	....	Stout—Ford—4A7
2200	100	..	35	600	..	....	36	500	....	Wl-ST	Wd-F	....	....	....	RC	....	....	21	....	Swallow—Commercial
1530	110	100	38	850	..	....	30	500	6	Wl-ST	Wd-F	Yes	SP	....	RC	....	....	..	Yes	Taylor Bros.—Chummy
2250	..	..	..	..	..	....	50	..	....	Wl-ST	Wd-F	....	S	....	....	....	....	..	....	Texas—Temple
....	..	..	..	..	..	....	120	..	....	D-cor.	D-cor.	....	De	....	Grs.	....	....	..	....	Thaden Metal—T-1
....	114	95	32	..	..	15,000	43	..	....	Wl-ST	Wd-F	....	S	....	....	....	....	..	....	Thunderbird
2100	100	..	40	..	..	....	42	410	8	Wl-ST	Wd-F	Yes	SPC	No	RC	....	....	30	....	Travel Air—*2000*
2400	130	..	45	..	..	....	60	..	12	Wl-ST	Wd-F	Yes	SPC	No	RC	....	....	32	....	Travel—*4000*
4000	126	08	57	750	..	15,000	78	700	12	Wl-ST	Wd-F	Yes	DeD	Yes	O	....	....	..	....	Travel Air—*6000*
2150	110	..	37	..	..	....	42	475	....	Wl-ST	Wd-F	Yes	SPC	....	RC	....	....	37	....	Travel Air—Caminez
2210	105	..	42	..	..	....	66	650	..	Wl-ST	Wd-F	Yes	SPC	....	RC	....	....	38	....	Travel Air—Siemens
1500	95	82	40	670	37	11,000	28	500	5 25	Wl-ST	Wd-F	Yes	SPD	....	Hy	....	....	..	....	Wallace—Touroplane
1900	97	90	35	600	..	14,000	40	350	8	Wd WIS	Wd-F	No	S	....	C	E	....	Apl	5%	Whites—Hummng Bird
2000	95	85	30	600	20	12,000	..	500	8	Wl-ST	Wd-F	No	SC D	No	RC	Own	$1,000	No	5%	Western—King Bird
12,000	100	85	35	600	..	20,000	300	1000	20	Wl-ST	Wd-F	Yes	C	Yes	Arl	No	....	..	Yes	Zenith—Albatross

FUSELAGE AND WING CONSTRUCTION:
B—Bolted
Cor.—Corrugated
D—Duralumin
F—Fabric cover
Mon—Monocoupe
O—Open section
P—Plywood cover
R—Riveted
S—Steel
T—Tubing
Wd—Wood
Wl—Welded

BRAKES:
B—Bendix
Ex—Extra
H—Hydraulic
L—Lockheed
S—Sauzedde
Std—Standard

LIGHTS:
N—Navigation lights

CONTROL:
A—Arens
C—Cables
D—Dual
De—Wheel
P—Push rods
S—Stick

SHOCK ABSORBER:
Arl—Aerol
C—Chord
D—Compression
Grs—Gruss
Hy—Hydraulic
O—Oleo
R—Rubber
RAR—Rusco Aero Rings
T—Trombone

GUARANTEE:
N—New

PONTOONS:
D—Duralumin
E—Edo
F—Fairchild
H—Hamilton
M—All metal
W—Wood

TYPE CERTIFICATE:
Apl—Applied for and is pending

N.Y. State Drafts New Flying Laws

Special Commission Formulates State Policy in Regard to Aviation

BUFFALO, N. Y.—A standardized aviation policy that will make flying in New York State as systematic as all other modes of transportation has been drafted into working order by a special legislative commission headed by Senator J. Griswold Webb. "Promote Safe Flying and You Encourage More Flying," has been the principal motto followed by the legislators in their work. And that their work has received widespread endorsement, is testified to by the fact that legislators from many other states that are contemplating aviation legislation are using the New York State policy as a model. Eventually it is hoped that every state will have regulations based along the same lines in order that aviators travelling from one state to another will not be confused by different regulations and innocently ride into an entanglement of law.

Must Have License

One chapter of the New York aviation laws requires that every pilot in the state operate his plane under a Federal Department of Commerce license, and it gives state officers full authority to enforce the statute.

State Troopers have already been instructed to make fliers up to the newly enacted laws. Convictions will mean fines and imprisonment or both, but it is believed and expected that no law enforcement campaigns will be inaugurated until the fliers have a chance to acquaint themselves fully with the laws.

Speed and altitude regulations are also under consideration by the legislators, who believe that eventually the air will be congested with planes and some such regulation will be required. The law makers also believe that operating an aeroplane at a high speed and a low altitude above crowded streets constitutes reckless flying, and there will be a law to curb reckless flying. At least the commission is doing everything to promote safe flying and they are empowered to draft laws to that end, so it is certain such laws will eventually be enacted.

The commission also has devoted much time to the establishment of safety means which are not as yet made necessary by force of law. Among these is the construction of hundreds of emergency landing fields throughout the state; arrangement to furnish daily weather reports, and to have five separate air routes covering every section of the state properly marked for both day and night flying.

The commission has communicated with every city, large and small, requesting that they do all within their means to establish suitable landing fields and to mark their communities by signs or other means to make them readily distinguishable from the air. All the cities have agreed to follow the instructions. Now the commission is urging each village to lend similar cooperation. When every city and village is properly marked by the end of the summer, a "New York State Aviators' Blue Book" will be issued. This Blue Book, like the Automobile Blue Book, will not only contain an accurate map of the state with every landing field, emergency or otherwise, marked, but will contain valuable information for the aviator which will be obtained from questionnaires already sent to hundreds of communities.

Headquarters at Albany

It is expected that Albany will be the headquarters for weather information. Gustave Lundgren, U. S. Meteorologist in that city has agreed to use his office for the purpose. Under his proposal, every section in the state will telegraph or telephone him a daily report on weather conditions, visibility and height of ceiling. He will then give the information out to inquirers.

The Commission also is developing five main airways to cover the entire state, and is negotiating with the federal government to have the routes officially established as national routes. The purpose of these routes is to encourage air traffic over well-beaten paths along which every means of flight safety has or will be provided. All the routes will connect with important international and national airways.

The method of procedure to bring about a model aviation policy was for the commission members to visit many sections of the state and hold conferences with aviators and aeroplane manufacturers. Senator Webb also was granted the use of a government plane and army pilot to make trips to other states that are working out aviation legislation.

Loening Planes For Canadians

NEW YORK, N. Y.—Another Loening Cabin Amphibian is being delivered by air to a unit of the International Air Service, Ltd., at Hamilton, Ontario, according to the Loening Aeronautical Engineering Corp. of New York.

An order has also been received from the Northern Aerial Minerals Exploration Ltd. of Toronto. This is the fourth of these planes to be sold for service in Canada during the past few weeks, two others having already been delivered to the Canadian Transcontinental Air Servile of Montreal and Quebec.

The service of Northern Aerial Minerals Exploration, Ltd., is particularly interesting as the planes are to be used in Northern Canada near Hudson Bay, may miles from towns, railroads or roads of any kind.. A whole country is to be opened up entirely by the use of aircraft.

Brooks Now Manager of the Gates Circus

PATERSON, N. J.—Several changes in the personnel of The Gates Flying Circus, subsidiary of the Gates-Day Aircraft Corp. here, have resulted in the appointment of William Brooks, former Chief of the Nicaragua Air Service, and noted as one of America's first aerial soldiers of fortune, as general manager in charge of the operations of the circus on tour.

This unit of the Flying Circus is operating under the auspices of the American Society for the Promotion of Aviation and during the first half of the season carried more than 55,000 passengers at the cost price of $1 per ride.

Clyde E. Pangbron, formerly in charge of the road outfit, is now in Paterson, N. J., as test pilot for the Gates-Day Aircraft Corp., manufacturers of the New Standard planes.

The road organization under the direction of Major Brooks has left Teterboro Airport for the New England States, where it will continue its "fly at cost" campaign.

Lee R. Cain has been appointed assistant general manager, while pilots include Okey Bevins, Chester D. Vogt, and Homer Fackler.

California Oil Firm Buys a Boeing Plane

SEATTLE, WASH.—The Boeing Airplane Co. has made the initial sale of its Model 43 de luxe four-passenger plane for commercial purposes. The Association Oil Co. of California was the purchaser. It is a duplicate of the new machines turned out in the local plant for the Boeing and Pacific Air Transport lines.

The plane will have dual control and accommodations for two passengers in the cabin, which will be furnished in the latest style for pleasure planes. The Associated Oil Co. will use it for sales promotion and for transportation of officers on business trips.

The contract was made by F. M. Rowles, sales manager of the oil company and Emory Bronte, who was pilot for Ernie Smith on the Hawaii hop last year.

Hankford Wins Gary Air Show Race in a Swallow

GARY, IND.—The Gary Flying School, managed by George and Henry Austgen, recently held an air show here. The feature event, a race over a five mile triangular course, was won by Russell Hankford, who operates the Chesterton School of Aviation. Hankford flew a Swallow plane. Bill McMahon, flying an Eaglerock, took second.

The aerobatic program was under the direction of George Austgen and Russell Hankford. Sergt. Jack Dunn of the Helma Air Circus made parachute drops for the spectators, using the newly developed back pack manufactured by Thompson Brothers of Aurora, Ill. The chute is of 28 ft. diameter and is made of mercerized cotton.

XPN 12 Shatters Six World Marks

Lieut. A. Gordon Pilots Seaplane on Record Breaking Flight

PHILADELPHIA, PA.—Six world records for its class were broken recently when the new Navy seaplane XPN-12 landed at the League Island Navy Yard after flying back and forth over a 50 km. course (31.07 mi.) between its hangar and Claymont, Dela., for 16 hrs. 38 min. American Aeronautical Association officials, stationed at each end of the course, timed the flight.

Lieut. Adolphus Gordon, flight officer at the Navy yard aircraft factory here, was

Lieut. Adolphus Gordon

at the controls, Earl Reber, boatswain at the aircraft factory, acted as relief pilot, and Andy Lowry and Elwood Townsend were the mechanics on the record shattering flight. The XPN-12, designed by Henry S. Cocklin, is an all-metal biplane flying boat powered by two Pratt & Whitney "Hornet" engines each developing 500 hp. The plane has a 73 ft. span, is 49 ft. 2 in. in length, and 14 ft. 6 in. in height. It is said to weigh 7,700 lbs. empty and 19,600 lbs. with full load.

The New Records

The six records were for flight duration, for flight range carrying a load, for speed at distances up to 1,250 mi. carrying loads of 1,100 lbs., 2,200 lbs., and 4,400 lbs., and for flight range carrying a specified load of 2,200 lbs.

In its endurance flight of 16 hrs. 39 min., the XPN-12 handily surpassed the old listed mark of 11 hrs. 7 min. 18 sec. for this type of craft. In flying 2,150 km., or nearly 1,350 mi., with full load, the flying boat broke the old mark of 1,525 km., of 947 mi., as well as the record for the specified load of 2,200 lbs., the previous mark for this latter feat being 1,247 mi. To break the three speed records for the 1,100 lb., 2,200 lb., and 4,400 lb. loads, the XPN-12 flew at an average of 83 m.p.h. over the shuttle course arranged for the test.

This plane follows close on the heels of the PN-12 in breaking a number of seaplane records at the League Island Navy Yard. The PN-12 was wrecked a short time ago off the Virginia Capes.

Lieutenant Gordon, who piloted the XPN-12 was named to the Navy air racing team in 1925; Reber, relief pilot, was with Macmillan expedition to North Greenland in 1925.

Fliers Near Home On Globe Journey

San Francisco.—Charles Collyer and John Henry Mears are, at this writing, in mid-Pacific on the the Empress of Russia bound for Victoria, B. C., with their Fairchild Cabin Monoplane "City of New York." .Having thus far successfully met their schedule, the fliers expect to fly across the continent to New York City without delay, making their round-the-world trip in 23 days—more than five days faster than the present record of 28 days, 14 hr., 36 min., held by Edward S. Evans and Linton Wells. After going by steamer from New York to Cherbourg, France, Collyer piloted the plane through Europe and Asia to Tokio.

New Source of Steel For Builders in West

WICHITA, KAN.—With the opening of a warehouse in Wichita, Kan., for the exclusive handling of special analysis steels used in the manufacture of aircraft, Western manufacturers will now be provided with a ready source of supply of this material. The warehouse has been established by the Aircraft Steel Co., headed by O. W. Wortman and A. E. Martin, who are thoroughly trained in this newest branch of the steel industry.

The concern is the only organization of its kind in the West handling aircraft steels exclusively and has excellent prospects. They have in stock at the present time a large supply of cold rolled strip steel in S. A. E. 1025 and chrome molybdenum analysis adding thereto a stock of tubing in both grades as well as round edge flat wire.

To Use Bellanca at Pole

NEW YORK, N. Y.—It is announced by Commander Douglas G. Jeffrey that he will use Giuseppe Bellanca's latest model monoplane, the J-5 as the principal aircraft on his proposed Antarctic expedition next fall.

Flood Relief Survey to Cover 1150 Sq. Mi.

EDDYVILLE, KEN.—The first of a series of Government aerial photographic flood relief surveys, said to be one of the most extensive ever undertaken, and covering an area of approximately 1150 square miles along the Cumberland River valley and through the states of Kentucky and Tennessee, was started recently at Eddyville, Ken., under direction of General Jadwin, Chief of U. S. Engineers. The survey, to be made in a Fairchild, folding-wing cabin monoplane, will require between 80 and 100 actual flying hours, during which 4,000 miles will be travelled and over 2700 aerial photographs will be taken to assist Government engineers in planning relief measures against future flood periods in the Mississippi Valley region.

The territory to be surveyed encompasses the area starting at Eddyville, Ken., thence on a southerly route through the state to Clarksille, Tenn., where the Cumberland River valley will be followed to Nashville, thence in a north-west direction to the upper reaches of the Cumberland ending at Hazzard, Ken.

Embry-Riddle Plane

The Fairchild plane to be used in the survey has been supplied by the Embry-Riddle Company of Cincinnati. The special photographic equipment and plates were sent by the Fairchild Aerial Surveys, Inc., of New York by special messenger to Cincinnati on Tuesday where they were installed in the plane preparatory to departure of the ship on the first leg of its three months survey. Pilot of the plant will be A. Vine of Cincinnati.

The present survey is said to exceed in size and scope that made last year for the Government by the Fairchild Aerial Surveys, Inc., in flood control investigation work along the Missouri River. At that time an area of approximately 900 square miles was surveyed by aerial photography, starting from St. Louis and ending at Yankton, S. D.

"Kit" Carson Named Eagle Distributor

Roy R. (Kit) Carson of Phoenix, has been appointed distributor for Arizona by the American Eagle Aircraft Co. of Kansas City. The first plane of this company's manufacture to find a home in Arizona, was recently delivered to Mr. Carson by Roy Theis, who flew it from the factory.

Carson is in charge of the U. S. Railway mail service out of Phoenix on the Santa Fe and Southern Pacific lines. He plans to fly his new plane, an OX5 motored, two passenger biplane with carrying capacity of 850 lbs. to Wisconsin and other Eastern States during August. Later it will be used by Sam Witten of the Van Buren Airport here for instruction work. Carson received his air training during the war, at Rosswell Field, San Diego, California.

Aero Insurance Pool Organized

Eight Fire and Casualty Companies Form United States Aircraft Insurance Group

NEW YORK, N. Y.—In order to provide a market for all forms of aviation insurance, eight leading American fire and casualty companies have pooled facilities under the name United States Aircraft Insurance Group to begin underwriting Aug. 1, 1928. With this system, each of the four fire companies entering into the combination will carry a share of the insurance written on each aircraft, while each of the four casualty concerns will in turn carry a share of the liability, accident, and compensation risks.

The fire companies in the pact are the United States Fire Insurance Co., the North River Insurance Co., the Pacific Fire Insurance Co., and the National Union Fire Insurance Co.; while the four casualty firms are the United States Fidelity and Guaranty Co., the New Amsterdam Casualty Co., The Maryand Casualty Co., and the New York Indemnity Co.

Managing Company Appointed

All insurance accepted will be written, it is announced, through the office of the United States Aviation Underwriters, Inc., 80 John Street, New York City, this company having been appointed aviation manager for the organizations composing the new group.

The underwriting will be under the control of David C. Beebe, president of the United States Aviation Underwriters, Inc., former air service pilot, and for the past eight years engaged in the insurance business in New York. The technical end of the business will be under the complete control of Reed M. Chambers, vice president of the United States Aviation Underwriters, at one time commanding officer of the First Pursuit Group, and since that time closely identified with the developments of commercial aviation.

Through this system of grouping of companies interested in the various classes of insurance in demand by aircraft manufacturers and others, protection of any type of risk is available and is secured to the policy holder in companies having an aggregate capital and net surplus of $74,078,333.

European Methods Studied

This substantial grouping has been brought about after a careful study of the methods used in the successful handling of aviation insurance in Europe, where aviation insurance is extensively written by such groups as the German Luftpool, British Aviation Insurance Group, French Consortium, Italian Consortium, and Scandinavian pools. The group system affords security that is ordinarily unobtainable.

With their customary foresightedness, and recognizing the growing number of their policy holders who are or will be shortly requiring protection against aircraft risks, these companies after a careful and most comprehensive study of the situation have arranged for the United States Aviation Underwriters, Inc., to assist their agents throughout the United States and Canada in providing the various types of protection in demand. Through the group system, the agent of any one of these companies and the brokers throughout the country have at their command the entire facilities of the group. The combined agency representation of these several companies, covering as it does practically every point in the United States and Canada, aviation protection will be readily accessible in the most remote parts in the United States and Canada.

Maj. R. W. Schroeder, former chief test pilot for U. S. Army Air Service, and later manager of the Ford Air Lines, has been retained in a consulting capacity. Major Schroeder for some years was in charge of the aviation department of the underwriters laboratories.

Maj. Irving Planning to Fly Across Pacific

OAKLAND, CALIF.—Maj. Livingston Irving, Dole race entrant who met with ill-luck at the take off, has announced his intention to fly the Pacific from Oakland to Tokio with John Kubota, Japanese pilot. The two plan to fly from the Oakland municipal airport to Tokio by way of Honolulu and the Marshall Islands, or to make a non-stop flight from Tokio to Oakland, some time in September or October.

Definite selection of the route to be followed will be made after consultation with Capt. W. B. Voortmeyer, local aerial navigation authority who plotted the charts for the "Southern Cross" on its Oakland to Sydney flight.

Maj. Irving and Kubota will fly in a tri-engined plane and will carry a navigator and radio operator with them. There is a possibility that Capt. Harry W. Lyon and James Warner of the "Southern Cross" crew may be asked to fill these positions.

New Company in Spokane

SPOKANE, WASH.—Formation of the Spokane Airways, Inc., with headquarters in Spokane, Wash., has been announced by H. J. Taplin, company president, and former British Army flier. W. H. Williams, transport pilot, is vice president, and E. H. Muller is secretary.

Agency for International biplanes in the Inland Empire area has been taken by the firm. It has purchased the five plane hangar of Dr. E. E. Langley and has ordered six planes, two of which have been set up and are in operation.

Curtiss Gets Tank Wagon

GARDEN CITY, L. I., N. Y.—A new tank wagon for servicing planes has been delivered by the Standard Oil Co. of New York at Curtiss Field here.

R. C. A. Man Begins P. A. A. Radio Tests

MIAMI, FLA.—Tests which may have an important bearing on future methods of communication between land radio stations and airplanes in flight, and which will be the basis of the operation of radio schedules for airplanes of the Pan-American Airways, Inc., in their flights from Miami to Colon, Panama, were started recently by H. C. Leuteritz, engineer of the Radio Corporation of America, at the Hialeah station of the Tropical Radio Telegraph Co.

Full co-operation of E. F. Bourne, station manager, and other officials of the company, has been offered Leuteritz. He will install a one-kilowatt transmitter of a special type, and will determine the feasibility of long distance communication with airplanes in this section of the tropics. If successful, Miami may be the central point of radio communication for airplane flights through Latin-America, it having attained an important position heretofore in keeping up communication with the four marine corps transport planes which were flown from Washington through Miami to Nicaragua.

Leuteritz was in conference a few days ago with Capt. J. E. Whitbeck, in charge of the survey and construction program in Central America, Cuba, and Miami of the Pan-American Airways, and A. H. Heermance, city aviation director. Captain Whitbeck announced that all airplanes of the airways will be equipped with a new type of radio apparatus weighing 85 lbs. and capable of both telephone and telegraph communication over long distances. The apparatus has been tested throughout the United States recently in airplanes flown on tests.

Installing Radio Beacons

Construction of radio beacon stations at Key West and Le Fe, Cuba, which is on the western tip of Cuba, also was announced by Captain Whitbeck. The Key West station will guide the airplanes across the Florida straits to Cuba and will be installed by the United States Department of Commerce. The Le Fe station will be installed by the Pan-American company and will guide the airplanes across the straits of Yucatan, a distance of 118 mi. The distance from Key West to Cuba is 110 mi.

Aviation engineers being employed by the Pan-American Airways for the Miami-Panama line are being trained in New York to operate the radio apparatus.

Boston Has 3 Club Planes

BOSTON, MASS.—The Dennison Airport Flying Club at Atlantic took delivery on its new Waco 10 recently. Club members are getting instruction from the corporation pilots Al Sherman and Albert L. Edson. The Technology Flying Club has taken delivery on its new American Eagle from the Bay State Flying Service at the Boston Airport. Thus there are now three club planes at Boston, Harvard's Travel-Air being the first.

Red Bird Co. Moves Factory From Bern

To Occupy Former Plant of Wichita Motor Co. in Oklahoma City

OKLAHOMA CITY, OKLA.—Oklahoma City's first and Oklahoma's fifth airplane factory has been established with the formation of the new Red Bird Aircraft Co. and removal of the small plant from Bern, Kansas, to Oklahoma City. The company has been incorporated with $400,000 capital stock.

At a cost of $110,000 the company, under the direction of E. G. Keller, purchased from Fank P. Johnson, Oklahoma City banker, the former Wichita Motor Company's branch factory southwest of Oklahoma City. Rehabilitation of the plant has begun and the first plane is expected to be completed about August 1st.

The new plant will hire about fifty skilled workers, some of whom are being brought from Bern, Kansas. The new building is one of the largest in the city from point of floor space and is on a paved road and railroad track besides having a thirty-six acre field adjoining it.

By September 1st the company expects to be in complete production of a plane a day. Two place and three place open cockpit biplanes will be the feature planes of the company. Besides these two models the company will also offer a two place and a four place cabin monoplane. The four place cabin monoplane will be powered with a Wright Whirlwind while all other models will use the Ox5 motor.

Harry Frey, engineer, of the company, started with the Lincoln Page Co. at Lincoln Nebraska in 1917. The other officers of the company are: Fred Durland, Oklahoma City, W. W. Driggs, Bern, Kansas, and D. G. Marshall, Wichita, vice presidents; Charles C. Lewis, secretary-treasurer, Winfield, Kansas; and D. B. Todd of Oklahoma City; D. M. Hennessy, Oklahoma City and Fred D. Olmstead of Ponca City.

Hallett Powered Victory Plane Nears Completion

NORTH HOLLYWOOD, CALIF.—Of rather conventional design but unusually sturdy construction, the new Victory biplane, a three place open cockpit type under development by the Victory Aircraft Co., of North Hollywood, is now near completion and full details of its performance will be available soon.

This plane, understood to be in the low price class, is nicely streamlined and is of exceptional ruggedness in order to withstand the rough usage to which the ordinary commercial plane is subjected.

The experimental model is equipped with a new Hallett radial, manufactured in Los Angeles. This type of power plant may be chosen for standard equipment on the Victory plane.

Boeing to Make Radiophone Tests

SEATTLE, WASH.—With the ultimate hope of making it possible to radiophone from an airplane to any place in tthe United States, work has been started on the remodeling of a big Transcontinental at the Boeing airplane plant in Seattle. The plane will be used for experiment with radio during flight, according to a recent announcement by P. G. Johnson, president of the concern.

The radio must be acoustically and electrically silent, and to get this result in an engine-driven machine is one of the problems to be coped with in the experiments. Present plans call for the use of an antenna of some kind. Other changes also are being made in the interior arrangement of the plane, which will be in the factory about six weeks more before trial flights, according to present plans.

Smith Company Reports A Brisk Initial Business

CLEVELAND, O.—Brisk business is reported here by the Stewart Aircraft Co. which began operations at the municipal airport on June 1. The company is distributor for Swallow airplanes, which are manufactured by the Swallow Airplane Mfg. Co. of Wichita, Kan.

One Whirlwind powered Stinson plane, a Warner powered Stinson Junior (now on the National Air Tour), and two Swallow biplanes are among the fleet of seven planes operated by the concern. The new $25,000 hangar, which the Stewart Aircraft Co. recently completed, has been equipped to render all services.

During the first month, several cross country trips have been made. Among these were a trip to Boston, two flights to Detroit, one to Chicago, and several inter-city trips.

The officers of the company are: Stewart V. Cramer, president; Otto I. Liesy, vice president and treasurer; Ted Griffin, secretary; and E. E. Basham, sales manager.

Aircraft Show to Open in Milwaukee July 25

MILWAUKEE, WIS.—The first aircraft show in Milwaukee will open at the Auditorium here on July 25. The show will continue for four days, closing July 28. The exposition was originally sponsored for the benefit of the American Legion Band, but following a change in plans it will now be staged for the Central Council of Relief and Hospital Welfare for welfare work among the veterans at Retshaven, Muirdale, and the National Soldiers' Home in this city.

Timm Plane to Try Endurance Flight

GLENDALE, CALIF.,—Flight test data on the Timm semi-enclosed cabin biplane will soon be available. The plane was recently completed and delivered to Capt. Roscoe Turner, who is preparing it for an attempt at the world's endurance record. A Menasco-Salmson engine will be used for this flight. Although load tests have not yet been made the tanks which have been installed have a capacity of approximately 750 gallons which would give a cruising range of more than 60 hours if the plane will lift that load.

The Timm factory in Glendale has recently taken over additional floor space which doubles the original area. The new building is being equipped as a doping and covering department. The company is now planning to shortly enter the market with a two place training monoplane of high wing, open cockpit type.

Plane Purchased by North Iowa Aero Club

MASON CITY, IA.—The North Iowa Aero Club of Mason City, organized early in the year under the sponsorship of The American Society for Promotion of Aviation, recently purchased a plane in which the members are taking flying instruction. The personnel of the club is composed to a great extent of ex-service men who, under the leadership of Harold W. Vogel, have established a unit that bids fair to increase very rapidly as the year goes on.

The officers of the club are as follows: Harold W. Vogel, president; J. Emerson Decker, vice-president; Fred W. Bruns, financial secretary; Robert V. Ikenberry, recording secretary; James C. Trindle, corresponding secretary; and Karl P. Johannsen, treasurer.

Newport Regatta to Include Air Program

NEWPORT, R. I.—The National Aeronautical Association has given its approval to an air program proposed for the second annual Narragansett Bay Motor Boat Regatta, August 17-18. This program will have as a feature attraction exhibitions by naval, marine corps, and civilian fliers.

Maj. Lorillard Spencer has offered the Southern Cross Trophy as a prize to the winner of a free-for-all 100 mile race. Flights by naval torpedo, amphibian, and observation planes, combat exhibitions by marine aviators, and contests for civilians will be a few of the events on the program.

140 Train at Roosevelt

ROOSEVELT FIELD, N. Y.—About 140 students are enrolled at Roosevelt Field now, and the flying field is steadily growing in popularity. Students are trained on Travel Aairs exclusively. All students and instructors are required to wear parachutes. Six of the students are men, one of whom is Joan Clement.

Richmond Aero Club Training Members

NEW YORK, N. Y.—One of the outstanding civilian aero clubs organized by The American Society for Promotion of Aviation of New York City is the Aero Club of Richmond, Staten Island, New York. Under the guidance of Lt. Ben Perricone of the New York National Guard Air Service, the Aero Club of Richmond was organized in November 1927. The Securing of Lt. A. L. Kolpien, former Naval Air Service flier, as instructor was a tremendous boost to the organization, and soon Lt. John Battle and Sergeant Hamilton of the New York National Guard Air Service were encouraged to give time for instruction purpose to the Club. Weekly meetings were held during the winter which were very well attended.

The club purchased a Standard last May in which members have been taking actual air instruction under the guidance of Lt. Kolpien.

Bellanca a Member

Recently the club assisted in the Jersey City Flying Club in the opening of its new field by sending the plane to the field and flying many of the Jersey club members and friends. Prominent among those listed as Honorary members of the Aero Club of Richmond are Congressman Anning S. Prall, a consistent aviation booster; Giuseppe M. Bellanca, President of the Bellanca Aircraft Corp.; Major George A. Vaughan, second ranking American Ace and Commander of the New York National Guard Air Service, and Lt. Marion L. Elliott, U. S. A. S.

Officers of the Aero Club of Richmond are, Lieut. Ben Perricone, President. Lt. A. L. Kolpien, Vice President, Harold J. Daly, Secretary, Nicholas Villanni, Treas., Ralph C. Capute, Fin. Sec. and Anthony Bitetti, Rec. Sec. Ten members who have shown to best advantage during the winter period of ground work have been rated as cadets and are receiving intensive instruction. A sizable surplus has been created in the club treasury at the present time and the Aero Club of Richmond now plans the sale of the Standard and the purchase of a more modern ship.

Interest in Aviation High at Phoenix, Ariz.

PHOENIX, ARIZONA.—Two recent occurrences have served to intensify the interest in aviation which still possesses the civic mind here. The first was the exhibition at the Adams Hotel of the entire series of aerial photographs of the State of Arizona, taken in the recent survey. The second was the announcement by E. A. Groves, Assistant General Freight agent for the Rock Island lines of a Chicago-Los Angeles 36-hour rail-air schedule, the air leg to be between Kansas City and Phoenix. Political and local disagreements are being put aside for the time in unanimous determination to put the municipal airport in readiness to accommodate the new passenger service.

Opens School at Quincy

QUINCY, ILL.—Charles Quinn, veteran pilot of Quincy Airways, Inc., 36th Street and Melrose Chapel, has opened a flying school, with instruction in engine construction, rebuilding planes, overhauling engines, and servicing as well as flying.

The Quincy Airways, Inc., has completed its new hangar and is finishing the office which will be a part of the structure. The building is 52 by 60 ft. with space for five airplanes. The 100 acre field is also being leveled and cleared, and its managers expect to make it one of the finest in this section.

Actor Pays Flying Visit to Old Home

WICHITA, KAN.—Fred Stone, internationally known comedian, who has been flying a Whirlwind-powered Travel Air biplane from one engagement to the other since early in the spring, dropped in one day last week on the town which he left 45 years ago to follow a circus around the country. It was Stone's first visit to his boyhood home in nearly a half century. All Wellington turned out to greet the comedian.

Stone first came to Wichita. After a visit of two days in Kansas he flew to Laramie, Wyo., where he joined friends in a fishing excursion of a few days. His next scheduled stop was Beverly Hills, Cal., for a visit with another world famous comedian, Will Rogers. Stone's plans called for a return flight to his home in Forest Hills, Long Island by the first of August.

Stone's biplane carries scores of original autographs, including such names as Clarence D. Chamberlin, Charles A. Levine, Bernt Balchen, Bert Acosta, Lieut. Bert Hall, Roger Q. Williams and others.

Waco Agents Lease Field

FORT MADISON, IA.—Charles Strong Memphis, Mo., and Stanley Jackson, Keokuk, have taken a one year lease upon the 40 acre tract in Baxter Field west of Ft. Madison, Ia., and will erect a hangar big enough for three planes, with service station and supplies equipment. Cecil Baxter, owner of the field, is attempting to have the field designated as an emergency field for the Chicago-Kansas City air mail planes. Aviation classes are to be organized, and it is reported that a score of prospective students have made application. Strong & Jackson are agents for the Waco and have one plane.

Flies to Enforce Game Law

BUFFALO, N. Y.—The Conservation Department has arranged for the use of airplanes to apprehend violators of the game laws in Western New York State. Prosecutor Willard Tillman will pass a part of each day patrolling the district in a Waco plane piloted by Arthur J. Seifert.

Pittsburghers Make L. I. Aero Inspection

MONTAUK POINT, L. I.—Nearly 100 business and civic leaders of Pittsburgh, Pa., recently visited here on a two day tour of inspection of Long Island flying fields and airplane factories. The men came on a mission of study in connection with the erection of a $2,000,000 airport at Pittsburgh.

At Montauk Manor, the party attended a dinner. Comdr. Richard E. Byrd, Maj. Gen. John F. O'Ryan, and Sherman Fairchild of the Fairchild Aviation Corp. were speakers. Clarence Chamberlin, New York City aeronautical engineer, was also among the prominent aeronautical men present.

In the morning the party was taken through the plant of the Curtiss Aeroplane and Motor Co. in Garden City. In the afternoon members inspected Curtiss, Roosevelt and Mitchel fields and were taken for short flights. Twenty-four of the visitors flew to the Fairchild plant at Farmingdale and the others went by train. The party looked over the Fairchild plant, then watched an exhibition of flying by Col. Arthur Goebel, Dole Race winner. The day following, the group witnessed an exhibition of seaplane maneuvers.

Among the members of the Pittsburgh group were Col. Taylor Allerdice, Norman Allerdice, William E. Costin, W. L. Monroe, Col. William Thaw, Howard S. Evans, D. M. Sheaffer, and Ray Tucker, Pittsburgh representative of AVIATION.

Fire Patrol Planes Do Week's Work in a Day

OAKLAND, CALIF.—The Oakland Municipal Airport is the base of operations for the Pacific Coast Air Service whose planes are patrolling California forests during the summer when the first hazard is high.

A 600-mile flight over the national forests in the Sierras was made in less than six hours on the first day of operation. This survey would have required more than a week of surface travel, according to Joe Barrows, operations manager.

Girl Solos After 2½ Hr.

ALLIANCE, O.—Miss Kathryn Fall, 16 yr. old high school student of Alliance, has made her first solo flight after only two and one half hours in the air according to her instructor, C. O. Bell of the Alliance Aero Taxi and Aviation School.

Miss Fall resides at 1054 Parkside Ave., Alliance, and is said to have taken her first airplane ride a week before making her solo flight.

Fly 122 Hours in a Week

BOSTON, MASS.—Squantum Naval Reserve Air Station has been getting in well over a hundred hours every week for some time. The week ending July 1 they flew 122 hours.

Add New Course At Parks College

Advanced Airplane and Engine Mechanics Instruction to Begin August 1

ST. LOUIS, MO.—A new course—Advanced Airplane and Engine Mechanics—has been added to the curriculum of the Parks Air College here, according to Derek White, dean of the college. The new course, an addition to the regular ground instruction offered by the school, is to open August 1, and an attendance of 200 students is expected.

For the new courses, which will qualify men for positions as airplane and engine mechanics, foremen, superintendents of factories, and other commercial aircraft organizations, complete new shops, engine rooms and class rooms have been built. This new course of instruction will be under the personal supervision of Oliver L. Parks, vice-president of Parks Airlines, Inc., Derek White, dean of the Parks Air College, and Richard F. Hardin, A. E.; Lieut., U. S. N. R. general superintendent has been added to the faculty especially to of ground school activiites. Mr. Hardin have charge of this division of the school. He is a graduate aeronautical engineer and has been actively engaged in aviation for approximately 14 years.

Hardin Experienced

He was for four years with the Douglas Company, Government contractors, where he not only helped put the World Cruisers, first planes to fly around the world, on paper, and helped build them as well. He was also in charge of production planning for the Ordinance Engineering Corp., was for two years instructor in the Naval Reserve Air School, and for the past year has had charge of a leading school on the West Coast and was Engineering Officer in the 11th Naval District. He has come to St. Louis for greater opportunity.

Engine instruction in the new division of the school will include practical work on Whirlwind, Liberty, OX-5, Anzani, Caminez, as well as other makes of new production engines.

Airplane work will include the construction of complete airplanes piece by piece. This will include wing building, covering and doping, steel tube fuselage construction, welding, blue print reading, factory production methods, etc.

Philadelphians Enter Meet

PHILADELPHIA, PA.—Philadelphia aviation organizations have arranged to be represented at the air meet to be staged by the Lancaster Airways, Inc., at the company's field near Lancaster on Saturday, July 21. The Ludington Philadelphia Flying Service, Inc., operators of the Philadelphia Airport, are sending one of their new Fairchild cabin monoplanes and several representatives.

Livingston Heads Midwest

MONMOUTH, ILL.—Control of the Midwest Airways Corp., Monmouth, Ill., passed to John H. Livingston recently when directors named him president of the corporation to succeed I. F. Dains, who has headed the company since it was launched in 1922. C. W. Buchanan is secretary and Mr. Dains treasurer of the board. Mr. Livingston is now completing plans for establishment of a chain of airports in Illinois and Iowa, with Monmouth as the center.

Reach High Altitude Testing New Engine

WICHITA, KAN.—G. Curtis Quick and his brother Tom, engineers found freezing weather above Wichita one day last week while their friends at the factory of the Cessna Aircraft company sweltered in the heat on the ground. The brothers took a Cessna monoplane up for an altitude test in order to secure data on the improved Anzani motor which has been developed by Clude Cessna, president of the company, and Curtis Quick.

The brothers spent one hour and 45 minutes in the air, reaching a point 13,800 feet above sea level and 12,500 feet above Wichita. Their feet and hands became numb from freezing temperatures. The engine and plane functioned perfectly at all altitudes, the engineers reported upon landing.

Credit for Chieftain Design to A. H. Leak

GARDEN CITY, L. I.—A new arrangement of 12 cylinders into hexagonal rows of two cylinders each is embodied, as described in the May 14 issue of AVIATION, in the new 600 hp. Curtiss Chieftain engine. Word has been received from Arthur Nutt, chief motor engineer of the Curtiss Company, that the credit for the use of this design in the Chieftain engine should go to Mr. A. H. Leak, Curtiss assistant engineer. who in 1926 worked out such an arrangement and suggested it to the Curtiss Company.

Apco Flying School Sold

VANCOUVER, WASH.—The Apco Flying school of Vancouver, Wash., has been sold by the Aeronautical Pursuits corporation to the Bush Flying Service, according to announcement of W. C. Bush, head of the service. The school will be combined with the one already operated by Bush. Capt. Jack Clemence, chief pilot and instructor of the Apco school, holds a similar position in the new organization. His assistant is Ellery Jepson.

The sale was made in order that the aeronautical Pursuits Corp. might concentrate on Travel Air plane sales, Clarence H. Farnham, head of the concern, said. The company is Northwest distributor of Travel Airs.

Banks Save Interest By Using the Air Mail

NEW YORK, N .Y.—Nearly a year ago a New York bank made the experiment of using the air mail between New York and the West. It was intended to keep it up for three weeks and for two weeks, owing to adverse flying conditions, it looked as if the experiment would end at the time set.

Then conditions changed and the air mail was delivered on schedule and the bank continued the plan until further tests showed its success. Now more than 20 New York banks use the air mail regularly five days a week and thus save one business day. Last May, checks aggregating $60,000,000 were sent between New York, Cleveland and Chicago and the saving in interest amounted to $5,730. This saving was much greater than the cost of the air mail and with the reduction in the air mail rate beginning August 1, the saving will be still greater.

There has never been any doubt that the air mail would be used if the schedule is arranged so that saving in time is actual and not merely theoretical. In order to be saving business hours, that is the time between 8 or 9 a.m. and 5 p.m., must be saved. Air mail that does not save some of these hours does not affect a saving that business men will value.

Cosgrove Appointed Travel Air Sales Rep.

C. B. Cosgrove of Tucson, Ariz., has been appointed by the Travel Air-Manufacturing Company of Wichita, Kansas, as sales representative for Arizona and New Mexico. He plans to give his entire time to this work, and to appoint branch dealers in the two States.

Mr. Cosgrove's major interests have been in the aircraft field for several years. While a student at the University of Arizona here, he became a member of the aviation committee of the Tucson Chamber of Commerce, a position which he still retains.

Firm Insures Employes

WICHITA, KAN.—The Stearman Aircraft company of Wichita is one of the first airplane corporations of the West, if not of the country, to aid employes in securing life insurance at an attractive rate. More than 60 employes of the Stearman company are included in a group policy contract written by the Equitable Life Assurance Society of the United States. The corporation pays a portion of the premium.

New Lincoln-Page Dealer

LOS ANGELES, CALIF.—Dycer Airport has been named sub-dealer in the Los Angeles territory for Lincoln-Page biplanes. The demonstrator is now on the field and is performing nicely with one of Dycer's rebuilt OX-5 power plants installed.

AIRPORTS AND AIRLINES

California Line to Increase Service

Los Angeles - Phoenix Run to be Extended to Douglas, Ariz.

LOS ANGELES, CALIF.—Following six months of successful operation of the Los Angeles-Phoenix Airline by the Aero Corporation of California, announcement has been made of plans for the immediate expansion of this service.

Present plans call for the extension of the present run to Douglas, Ariz., and to Fort Worth and Dallas, Tex., making connections with an Eastern air line at Dallas and providing a new transcontinental passenger service over the Southern Route.

A fleet of seven 10-passenger Fokker monoplanes powered with Pratt and Whitney Hornet engines and capable of a speed of 140 m.p.h. will be placed in service. These planes will be equipped with overstuffed chairs, silenced cabins, temperature regulators, and all necessary conveniences. The complete plans for this expansion, time tables and passenger fares will be announced later.

In order to provide capital for the new equipment the Tri-State Airlines has been merged with Standard Airlines, Inc., a subsidiary of the Aero Corporation of California. A stock permit has been secured and a large block of these securities will be issued. R. U. McIntosh, founder of Tri-State Airlines, will be associated in this work with Jack Frye, Pres. of Standard Airlines.

Four New Weather Stations Planned

WASHINGTON, D. C.—A report by the Aeronautics Branch, Department of Commerce states that 24 hour weather reporting service will be furnished to aviators from four new stations. The first station in operation is the Bellefonte airway station, in Pennsylvania.

Two other stations will be established in Pennsylvania, while the fourth station will be at Atlanta, Ga. The station at Atlanta is expected to be in operation very shortly and will furnish reports to all pilots and air lines using Atlanta as a terminal.

Atkinson Erecting Hangar

GARY, IND.—A steel hangar is being erected by the Atkinson Aviation Co. on that concern's field on South Broadway. The company, of which Capt. Jack Atkinson is president, has the Monocoupe agency.

Boston Legion to Erect Control Tower & Beacon

BOSTON, MASS.—A popular subscription of funds to erect a control tower on the Boston Airport has been inaugurated by the Crosscup-Pishon American Legion post of Boston. $50,000 is being sought and a four story structure with a glassed in top for the control officer and an aerial beacon at the peak, is planned. The ground floor will contain memorial plaques bearing the names of New England war time fliers who lost their lives, and panels memorizing the feats of various Boston airmen such as Byrd, Hegenberger, and Miss Earhart.

The building is to be of brick to harmonize with the new type hangars to be built along the sides of the field near Maverick Street.

Salt Lake to Great Falls Mail Route Opens Aug. 1

WASHINGTON, D. C.—The new air mail route between Great Falls, Mont., and Salt Lake City, Utah will be opened on Aug. 1, 1928 according to an announcement made by the Second Assistant Postmaster General W. Irving Glover. The National Parks Airways, Inc., is the contractor and will operate the air line over the new route C. A. M. 26.

Service will be established as follows:

North		South
10.20 a.m.	Salt Lake City, Utah	2.10 p.m.
10.50 a.m.	Ogden, Utah	1.50 p.m.
12.40 p.m.	Pocatello, Idaho	12.10 p.m.
3.00 p.m.	Butte, Mont.	9.40 a.m.
3.45 p.m.	Helena, Mont.	8.55 a.m.
4.30 p.m.	Great Falls, Mont.	8.00 a.m.

Legion Marks Alliance

ALLIANCE, O.—Twenty foot letters spelling the word Alliance and arrows indicating the direction of the airport and landing field have been placed by the American Legion on the roof of the McCoskey Register Plant at Alliance, O. The letters and arrows are three feet above the roof and are easily distinguishable for some distance. The Alliance City Savings Bank is painting the name of the city and direction arrows on its tall building.

Order Coast Beacons

LOS ANGELES, CALIF.—The Richfield Oil Co. has ordered a series of beacons to be placed along the coast from San Diego, Calif., to Blaine, Wash. These beacons will be placed at 50 mile intervals and will illuminate an aerial and land highway. The beacons will be built by the Electrical Products Corp. of Arizona. The beams will blaze from towers of 125 feet high.

N.A.T. Makes New Mail Route Stop

Tulsa Now Included in Run Between Dallas and Chicago

TULSA, OKLA.—National Air Transport, Inc., operator of contract air mail route No. 3 between Chicago and Dallas extended its regular overnight service into Tulsa on July 5. Earl Rockwood, field manager for National Air Transport, Inc., at Fort Worth, Tex., has been transferred to Tulsa to act as pilot on the new extension. He uses a Pitcairn Mailwing, powered with a Wright Whirlwind engine on the 75 mi. run between Tulsa and Ponca City, which is on the main line between Dallas and Chicago. The plane has a high speed of over 130 m.p.h. fully loaded, making it one of the fastest types of commercial planes in the country.

This new service places Tulsa only nine hours from Chicago and through direct connection with the transcontinental air mail line places Oklahoma only 17 hr. from New York City and less than 24 hr. from Eastern Seaboard cities extending from Washington, D. C., as far north as Rockland, Me.

Work Begun on New Consoldated Field

BUFFALO, N. Y.—The Consolidated Aircraft Corp. of Buffalo has begun work on its landing field where Consolidated planes will be tested. Twenty acres have been acquired by the corporation on Military road and the work of clearing and grading it began recently. It is expected the airport will be completed next month.

One hangar will be constructed on the field and more may be added later. The corporation is engaged in constructing planes for the United States government. However there will be no assembling plant or factory units on the airport.

The planes now being built will be tested by the company's pilots and by navy fliers, according to Major R. H. Fleet, president of the corporation, before delivery is made to the government.

Wisconsin Has 17 Fields

MADISON, WIS.—There are now 17 airports in operations throughout Wisconsin with 22 more planned. Three of the fields already in operation throughout the state—the Madison Commercial Airport, the Milwaukee Municipal Airport and the Wausau Municipal Airport—are equipped with rotation beacons, flood lighting facilities and boundary and danger lights.

U.S.-Canada Mail Contract Awarded

The Key West - Canal Zone Route is Also Assigned

WASHINGTON, D. C.—Postmaster General New has awarded to the Canadian Colonial Airways, Inc., of New York City, the contract for carrying the mails by air from New York City via Albany to Montreal, Canada, one way, at its bid of 6 cents per mile.

The successful contractor already holds a contract from the Canadian Government for the southbound trip from Montreal to New York City. Service under the contract, is to be inaugurated within 6 months and is to run for a 10 year period. Air mail postage will not be required on this route but regular first-class mail will be carried.

The Postmaster General also awarded to the Pan American Airways of New York City the contract for carrying mail by air from Key West, Fla., to the Canal Zone at its bid of $2.00 per mile. This route is 1,640 mi. long and provides for stops at Havana, Cuba, Merida, Mexico; Belize, British Honduras; Tegucigalpa, Republic of Honduras; Managua, Nicaragua; San Jose, Costa Rica; and Cristobal, Canal Zone, with service seven times a week. The Postmaster General, under the contract, will reserve the right to include Guatemala and Salvador in the route, and also to extend it southward from the Canal Zone to Cartagena, Columbia; Maracaibo, Venezuela; Curacao, D. W. I.; La Guaira, Venezuela, Port of Spain, Trinidad; Georgetown, British Guiana, and Paramaribo, Dutch Guiana, one way three times a week.

The contract for the route from Key West to Porto Rico has been held in abeyance, pending further investigation on the part of the Post Office Department.

Inaugurate Regular Service from Akron

AKRON, O.—Round-trip service to nearby cities was started July 8, by Akron Airport, Inc., operating from Stow Field near Akron, Ohio. Planes are to be operated on regular schedule, one leaving the field every thirty minutes, on the hour and half-hour, according to announcement made by Allen T. Simmons, president of the company. Cities to which the new routes extend include Cleveland, Canton and Youngstown.

Since the organization of Akron Airport, attempts have been made to provide up-to-date air service of all kinds for Akron and vicinity. Other extensions of service will be inaugurated as rapidly as possible, according to officials.

Providence, R. I., to Have Air Signs

New York, N. Y.—Aerovane Utilities Corp. of New York City expects to erect several combination airway-highway sign posts on 10 highways leading into Providence, R. I., within a short time. It is expected that these signs will be self-supporting through billboard advertising space.

For the aviator it presents a 13½ ft. arrow with the name of the town, toward which it points, painted thereon, a small superimposed arrow pointing north, and a wind cone. All are readable at a maximum altitude of of 3,000 ft. according to available statistics.

For the motorist there will be the usual road information and local advertising matter.

It is anticipated that the system will be extended throughout Rhode Island. These airway-highway sign posts are also being installed on the outskirts of 19 towns in North Carolina and along 350 mi. of improved roads following the New York-Atlanta airway.

Oakland Airport Is Model in Operation

OAKLAND, CALIF.—Although only a year old, the Oakland Municipal Airport has become the model for many operators of airports in other cities throughout the country, George B. Hegardt, Oakland port manager, reported upon his return from Los Angeles.

In the Southern California City, Hegardt attended the Association of Pacific and Far East Ports Convention, where he lead the discussion on airports and where Roscoe D. Jones, president of the Oakland Port Commission, was named second vice president of the Pacific Port Association.

Firmly recommending the development of airports by municipal port authorities, James H. Polhemus, chief engineer of the port of Portland, continually referred convention delegates to the Oakland Municipal Field as an administration and operation model for other cities to follow, Hegardt said.

The Oakland municipal airport is regarded as an integral part of the city's harbor and as such is under the sole jurisdiction of the Board of Port Commissioners, a non-political appointive body.

Somerset, Pa., Marked

SOMERSET, PA.—The name "Somerset Pa." with an arrow pointing north has been placed on the roof of the Ferner Hotel here in yellow block letters 16½ ft. high and 10 ft. wide with a four foot space between letters. H. E. Morrison, chairman of the city airport committee, states he would like to hear from pilots flying over Somerset as to how the sign shows up from the air.

St. Tammany to Fly Border Mail

Completed Air Postal System Directly Connect Boston with Merico City

WASHINGTON, D. C.—Postmaster General New announces that he had awarded to the St. Tammany Gulf Coast Airways, Inc., of New Orleans, La., the contract for carrying the mails by air from New Orleans via Houston and San Antonia, to Brownsville or Laredo, Tex., at its bid of $1 per pound.. This cas the lowest of five bids received.

This new service, when inaugurated, will connect with the air mail service to be established by the Mexican Government from the Ameircan border to Mexico City. It will mean a direct mail service by air from Boston, Mass., via New York City, Atlanta, Ga., and New Oreans, La., to the Mexican border and Mexico City.

Under the tentative schedule as arranged, it is planned that a plane leaving Boston at 6.15 P. M. one evening wil reach the Mexican border at 2.30 P. M. the afternoon following. Mail dispatched by train at the present time is en route four days from Boston to the border. The schedule from the border to Mexico City by airplane will be worked out by the Mexican Government.

Midwest Airways to Have Airport Chain

MONMOUTH, ILL.—In opening a new field at Waterloo, Iowa, during the first week in July the Midwest Airways Corporation took the first step in a policy of expansion which calls for a chain of fields in Illinois and Iowa during the next few months. The Midwest Airways Corporation distribute Waco and Ryan airplanes in the two states.

Since January 1, 1928, the company has delivered 51 Waco Ten airplanes to purchasers in its territory, according to John H. Livingston, president and general manager. Owners of these planes living in Iowa will be able to get immediate service on repairs from the new Waterloo field, which has a ten ship hangar completed. Oren P. Harwood, chief pilot and sales representative of the company, has moved to Waterloo and will have charge of the company's Iowa business. The Waterloo field is "T" shaped and is located four miles due east of the city.

Field Named for Boeing

SEATTLE, WASH.—In honor of W. E. Boeing, chairman of the boards of directors of the airplane companies bearing his name, the King County airport at Georgetown has been officially named Boeing Field.

Pitcairn Installs Four New Fueling Stations

PHILADELPHIA, PA.—Pitcairn Aviation, Inc., operator of the New York to Atlanta air mail service, with headquarters in the Land Title Building, this city, have announced that high speed gasoline filling stations are being installed at the four southern fields operated by the company to expedite the servicing of Pitcairn Mailwings on the New York-Atlanta route.

The new filling stations are being installed at Candler Field, Atlanta, Ga.; the Tri-City Airport, at Greensboro, N. C., the municipal airport at Spartanburg, S. C., and the Richard E. Byrd Flying Field, at Fort Lee, near Richmond, Va. At present, planes refuel from ordinary gasoline hand pumps, such as those used for automobile pumping stations, or from five gallon tanks carried out to the planes on the line.

The new systems to be installed include a sunken pit placed flush with the surface of the ground on the flying line and in which are a reel holding a fifty-foot hose and a meter to record the amount of gasoline put in a plane. An electric pump maintains a constant flow of gasoline, which is controlled by a valve at the nozzle of the hose. With this system, Pitcairn officials say, a plane can taxi to any point within fifty feet of the filling pit and take on gasoline at the rate of eighteen to twenty gallons a minute—three times as fast as the old system.

Plan Seaplane Base in Buffalo Harbor

BUFFALO, N. Y.—Commissioner James P. Moore recently sent a recommendation to the common council that immediate steps be taken to obtain permission of the Federal Government to use lands in the harbor here as a port for seaplanes.

The commissioner stated that the development of lands lying southerly from the lighthouse and the coast guard station for accommodation of seaplanes, would be an important factor in promotion of aeronautical transportation. The proposal was discussed at a meeting of the state legislative committee on aviation with city officials, aircraft transportation and manufacturing officials.

Hudson Boat Company to Offer Air Service

NEW YORK, N. Y.—Announcement is made by the Hudson River Night Line to the effect that in September they intend selling tickets through to Montreal. The tickets will provide for travel by boat to Albany and by airplane from Albany to Montreal.

According to the planned schedule, a passenger will leave New York on a Night Line boat at 6 P. M. He will arrive in Albany at 5:30 A. M. and board an airplane operated by the Colonial Airways in Albany at 7 A. M. The plane is scheduled to arrive in Montreal at 10 A. M. or shortly after.

The Night Line has also arranged to make connection at Albany with planes leaving for Cleveland, Buffalo, and points west.

Air service to vacation spots in the Adirondacks is contemplated by the company as for instance Lake Placid and Lake George. Seaplanes will make the journey from the Hudson at Albany to the northern lakes.

Build Hangars on New Miami Airport

MIAMI, FLA.—The second link in a chain of international airports is now under construction at Miami, according to an announcement by the Pan-American Airways, Inc., of New York, operator of the Key West-Havana air mail and passenger route. This airport which is located at 36th Street in Miami, on 135 acres of land, will be used by the company as a base terminal in the new passenger and mail service to be operated between that city and Havana, Cuba, and other points in the Caribbean.

Large hangars 100 x 100 ft. are now being erected together with passenger terminals, restaurant, and custom immigration offices. This new airport is less than half the distance from the heart of the city than the present municipal airport. According to present plans the Pan-American Airways will have completed all arrangements by Jan. 1, 1929, so that passengers from the United States may leave either Miami or Key West and fly over the Caribbean as far as Colon in the Canal Zone by way of Porto Rico.

New Service Planned

PHOENIX, ARIZ.—Jack Frye, president of the Aero Corp. of California, which is now maintaining a thrice-a-week service between Los Angeles and Tucson, via Phoenix, recently announced in an interview here that his company intends in the near future to extend its service to Fort Worth, Tex. Fokker monoplanes Model F7 with 410 h.p. Pratt and Whitney "Wasp" engines will be used in this service. Each machine will carry eight passengers.

The date of this extension depends entirely upon the delivery of enough planes. As the company's offices here could at the present time easily sell twice the number of tickets which the capacity of their planes will permit, it is believed that the demand will justify making the Los Angeles-Fort Worth Schedule a daily one.

Sewall Has New Post

BOSTON, MASS.—Sumner Sewall, since 1926 traffic manager at Boston for Colonial Air Transport, Inc. has been promoted to a similar position with the three Colonial lines, Colonial Air Transport, Inc., Colonial Western Airways, Inc., and Canadian Colonial Airways, with his office in New York. He expected to move to New York soon.

Plan U. S.-Mexico Mail Line by Sept.

WASHINGTON, D. C.—Word has been received at the Post Office Department from Cosme Hinojosa, Postmaster General of Mexico that his government is hopeful of establishing air mail service from Mexico City to Neuvo Laredo, where it will connect with the United States line from New Orleans to Houston to Laredo, by Sept. 15, 1928. This is contingent on the receipt by the Mexican government of planes ordered from the Stinson company and which have been promised early in August.

Second Assistant Postmaster General W. Irving Glover announced today that negotiations for the establishment of air mail service from Brownsville, Tex., to Mexico City via Tampico have temporarily been abandoned. Glover further declared that he is hopeful that at a later date Mexico will be willing to provide a further air mail line from Mexico City to Brownsville for carrying first class mail. This is in accordance with legislation passed at the last session of Congress authorizing the Postmaster General to negotiate with foreign governments for carrying first class mail by air.

Wichita, Kan., to Have Second City Airport

WICHITA, KAN.—Wichita now has two muicipal airports, one of 150 acres, in operation for several years, and another of 640 acres which is being improved now.

Final provisions of the lease and sale contracts for the original landing field of 150 acres here have just been approved by the board of park commissioners. The city has purchased equipment on the field for approximately $18,000 and has agreed to pay an annual rental of $1,788 as well as taxes on the field. Under the terms of the contract the city will own the field for a period of at least two years. It is thought the 640-acre airport, considered by nationally known aviators as one of the best in the country, will be fully equipped within six months or a year at the most. The city recently paid $64,000 for the 640-acre tract.

Volume Increases on Buffalo Mail Routes

BUFFALO, N. Y.—During the month of June, 804 lb. of airmail were carried over the Buffalo-Cleveland route according to Postmaster Robert W. Gallagher. The average daily load was 26 lb. and the total for the month exceeded May by 75 lb. A total of 268 lb. was shipped over the newly opened route between Buffalo and Albany during June.

The first month's record over the Buffalo-Cleveland route was 211 lb. which is taken by postal authorities to indicate that the route to the East may prove more profitable than to the West.

FOREIGN ACTIVITIES

Heinkel Plane Is Exhibited in Paris

Ocean Going Hydroplane Is Among Most Interesting Exhibits at Salon

PARIS, FRANCE.—Included among the most interesting exhibits at the Aero Salon of 1928 in Paris was the Type H. E. 5 ocean going hydroplane of the Ernst Heinkel Aeroplane Works at Warnemunde, Germany. The H. E. 5 is a low wing, semi-cantilever monoplane, powered with a 500-750 hp. B. W. W. VI engine. It is the result of ten years of experimentation and improvement of the first ocean going monoplane designed by Dr. Heinkel in 1918 which excelled in performance the best biplanes of that time. The original H. E. 5 won, among other contests, the German Marine Flight Competition in 1926 and subsequently made two world altitude records for loads of 500 and 1000 kilograms (1102 and 2204 lb.). This plane is used by the sea light section of the German School for Traffic Pilots for the training of advanced students and radio operators in long distance flights over the North Sea.

The newer model is characterized by aerodynamic accuracy in design and has shown highly satisfactory performance. In the trial flights it attained a speed of 138 m. p h. and climbed to 3280 ft. in 3.1 minutes. At the end of seven minutes after the take off it had attained an altitude of 6560 ft. The landing speed was 54 m. p. h.

The H. E. 5 is rugged in construction throughout. The fuselage is built of steel tubing and covered with light metal from the front station to a point behind the observer's seat. The remainder is covered with fabric. The tail group is also of steel tubing covered with fabric. Light metals are used only for parts of secondary importance. The wing structure, including spars and ribs, is of wood, fabric covered.

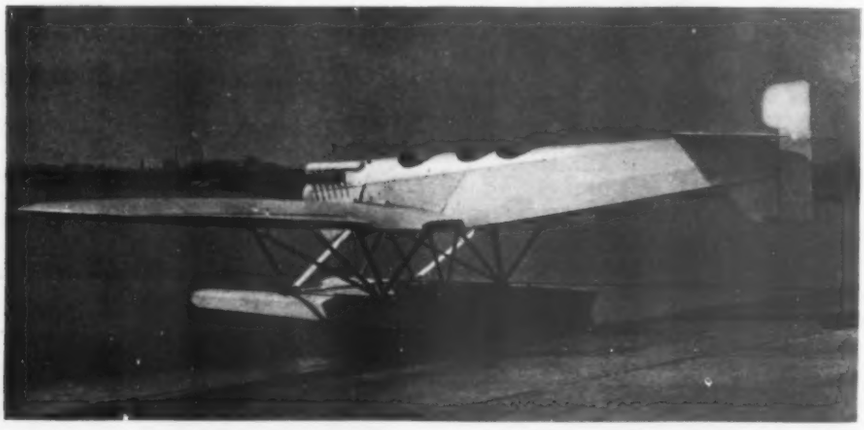
Floats are built entirely of wood and divided into seven water tight compartments. They are suspended from the fuselage and wing structure by a system of struts designed for great strength.

The specifications as supplied by the manufacturer are as follows:

Wing span	55 ft. 1 in.
Overall length	39 ft. 10 in.
Height	13 ft. 10 in.
Wing area	526 sq. ft.
Engine	Bavarian Motor Works (B.M.W.) Vla (7.32) 500 to 750 hp.
Weight empty	1440 lb.
Load	1980 lb.
Total weight	6380 lb.
Speed (maximum)	138 m. p. h.
Climb	1058 ft. per min.
Landing speed	54 m. p. h.
Factor of safety (with wt. 6380 lb.)	7.0
Wing loading	12.1 lb. per sq. ft.
Power loading (500 hp.)	13.8 lb. per hp.
Power loading (750 hp.)	12.7 lb per hp.

Clubs Forming in Scotland

EDINBURGH, Scotland.—The movement toward the formation of private clubs in Scotland has been slow to start, although such clubs were formed in England five years ago. The first Scottish flying cub was established in Glasgow a few months ago and the formation of the second, the Highland Club, was recently completed in Inverness. The Edinburgh Aero Club was inaugurated in March, 1928.



Rear quarter view of Heinkel ocean going monoplane exhibited at Paris Salon

New Zealand Gov't Provides Aero Clubs with DH Moths

WELLINGTON, NEW ZEALAND.—The New Zealand Government has decided to purchase eight DH Moth airplanes, four of which will be allocated to newly organized aero clubs at Christchurch and Auckland. The other four will be used for training purposes at the Wigram Airdrome, Christchurch. It is proposed to organize six more aero clubs in the Dominion each with a minimum membership of 30.

To any approved club or association the Defence Department will issue on loan two DH Moth airplanes to be used by the association. This assistance will be given only to organizations having at least 30 members prepared to qualify as pilots and providing for the proper maintenance of loaned equipment and for the services of an instructor on terms and qualifications approved by the Department.

Airplanes Supplant Mules In Bolivian Transportation

LA PAZ, BOLIVIA.—Three new Junkers planes have reecntly been received and pilots, mechanics and ground crews are being trained in the flying school of the Lloyd Aereo Boliviano at Cochabamba. Regular service is maintained between Cochabamba, Santa Cruz, Vallegrande, Trinidad, and Todos Santos. Special flights are made from Cochahamba to Oruro and La Paz and to Potosi and Sucre; and other trips can be arranged.

The company meets a transportation need that arises from lack of railroads and highways. The trip by road from Cochabamba to Santa Cruz takes about 12 days, and is made largely by mule-back. Planes cover the flying distance in about 2½ hours; the fare being 250 bolivianos, one way. During 1927, 263 flights with a total of 60,164 kilometers were made by the company's planes. 1,080 passengers, 2,626 lb. of mail, 15,734 lb. of baggage, and 20,710 lb. of freight were carried.

To Form New Chinese Line

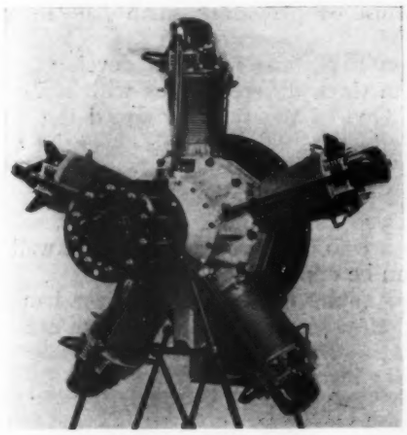
SHANGHAI, CHINA.—The proposed commercial air service between Hongkong and Canton will be carried on by a joint-stock company, with one half of the shares subscribed by those interested in Hongkong and one-half in Canton. Several machines of the type used in an early stage of the regular commercial service between England and France, which can carry six passengers at a time, will be purchased from Great Britain.

Bristol Making a New Type Engine

Five Cylinder Radial Is Similar to Well Known Jupiter in Design

FILTON, ENGLAND.—The Bristol Aeroplane Co., Ltd., of Filton, Bristol, is now in production on a new five cylinder air cooled radial engine designated the Bristol Titan. This engine has been desgned to satisfy the demand for a power plant to be used in commercial or service instruction planes. It embodies many of the features in design and workmanship found in the well known Bristol Jupiter engine.

The Bristol Titan is a static radial engine deevloping 200 b. h. p. at 17000 r. p. m. and 220 b. h. p. at maximum



Front Quarter View of Bristol Titan Engine

speed of 1870 r. p. m. It has a bore of 5¾ in., a stroke of 6½ in. and a compression ratio of 5:1. The weight of the engine dry is 500 lb. The fuel consumption is 13 gallons per hour and the oil consumption 2 pt. per hour.

Cylinders are of composite construction having a machined steel barrel and cast aluminum alloy head. The barrel with its integral fins is machined from an alloy steel drop forging. It has an integral combustion chamber upon which the overhead valves, two intake and two exhaust, seat directly. The cast aluminum alloy head contains the valve ports and carries the valves, valve guides and rocker mechanism. It is secured to the steel barrel by studs and set screws, a faced joint being made with the cylinder barrel to insure the maximum heat conductivity. To compensate for the difference in expansion between the aluminum head and the steel securing studs, Invar packing sleeves are fitted under the nuts, insuring good contact between head and barrel throughout the range of working temperatures.

Pistons, of the slipper type, of cast aluminum alloy are employed and carry two compression rings and one oil scraper ring of special design. The wrist pin floats in both piston and connecting rod and is secured against end motion. Pistons and cylinders of the Titan are interchangeable with those of the Bristol Jupiter engine. The connecting rod assembly is similar to that of the Jupiter engine and consists of a big end master connecting rod and four articulated rods. All bearing surfaces are of ample area and well lubricated resulting in low bearing pressures and great economy in oil consumption.

The induction system embodies an engne driven mixture distrbutor fan owing to the impossibility of using the Jupiter spiral induction system on a five cylinder engine. The carburetor is an oil heated type and is similar to the one used on the Jupiter engine. An oil heated nduction elbow attaching carburetor to mixture chamber insures good vaporization of mixture under all flying conditions. Dual high tension magnetos are used for ignition.

Accessories and auxiliary drives are grouped at the rear of the engine giving them full protection and allowing a simple cowling to be used. A standardized conical mounting, projecting backward from the rear of the engine allows the front to be dismantled without removing the engine from the plane. Provision is also made for an Eclipse Inertia Starter to be installed. The engine has been granted a British Air Ministry civil type test and accepted as airworthy under the Air Navigation Regulations and Directions Act.

The specifications furnished by the manufacturer are as follows:

Bore	5.75 in.
Stroke	6.5 in.
Total swept volume	842 cu. in.
Compression ratio	5:1
Rated power and r. p. m.	200 b. hp. at 1700 r. p. m.
Power at maximum r. p. m.	220 b. hp. at 1870 r. p. m.
Propeller	Direct drive tractor
Carburetor	Bristol Duplex Oil heated
Ignition	Dual, 2 high tension magnetos
Lubrication system	Pressure
Tachometer drive	¼ engine r. p. m.
Dry weight	500 lb.
Fuel consumption	13 gal. per hr.
Oil consumption	2 qt. per hr.

Aviatrix Sets Record

PARIS, FRANCE.—A world's distance record for light craft flying from Le Bourget to Teptow in Pomerania, a distance of 788.67 mi. was broken by Mlle. Maryse Bastie, who flew a Caudron plane with a 40 h.p. Salmson engine. Mlle. Bastie covered the distance in 11 hrs.

Maurice Drouhin, who will pilot Cousinet's Rainbow plane in the proposed transatlantic flight and who gave Mlle. Bastie her first lessons in flying, accompanied her as a passenger in her record breaking trip.

French Railroads to Form Subsidiary Air Mail Line

BORDEAUX, FRANCE.—Approval has been given by the French Government for the formation of a subsidiary company of the railroads for the organization of an air mail line between Bordeaux and Geneva. The new line will cross France in the central portion where rail service is indirect, connecting Bordeaux, Limoges, Lyons, and Geneva. Many hours will be saved.

Day service will first be inaugurated this summer, and with beacons installed, as is later planned, night service will be offered.

The new company will be an innovation in France, for heretofore, mail, passenger, and freight routes have been controlled by concerns whose primary business was the manufacture of aircraft.

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To Patrol Canadian Fisheries from Air

VANCOUVER, B. C.—A report from the American Trade Commissioner at Vancouver, E. G. Babbitt, states that through the operation of a two years contract with the Western Canada Airways, Ltd., an aerial patrol of the entire fishing territories of British Columbia will be conducted. This patrol will be established to guard against illegal operations.

Maj. J. A. Motherwell, inspector of British Columbia fisheries, has recommended that the contract call for 400 flying hours between July 1 and September 20.

Canadain Ship-Shore Service Inagurated

TORONTO, CANADA.—Mail was removed from the steamship "Empress of Scotland" at Rimouski, Quebec, near the mouth of the St. Lawrence River and about 705 miles from Toronto, on May 6, 1928, and transported by airplane to Toronto, inaugurating air mail service into that city. This was the beginnning of regular service by the Canadian Airways, Ltd., which has the Government contract for carrying mail from Toronto to Montreal. A transcontinental airways plane carries the mail from Rimouski to Montreal. Aside from the special delivery fee there is no extra charge for letters carried by plane.

Canadians Form New Club

TORONTO, CANADA.—The Granby Light Airplane Club, Granby, Quebec, was inaugurated June 16 bringing the total number of airplane clubs in Canada to 11 with 10 others in formation. Fourteen DH Moth planes have been alotted to the clubs by the Dominion Government.

THE BUYER'S LOG BOOK

Pioneer Air Speed Indicator

THE PIONEER air speed indicator is a navigation instrument of primary importance serving the double purpose of indicating the speed of flight and advising the pilot at all times of the degree of support secured by the passing of air around the wings. It is manufactured by the Pioneer instrument Co., Inc., of 754 Lexington Ave., Brooklyn, N. Y., and conforms with the usual high quality and serviceability of Pioneer Instruments.

The use of an air speed indicator enables a pilot to remain at all times within the safe flying range speed of his plane. This eliminates the danger of approaching the stalling point at the lower extreme or the condition of a dangerously steep dive at the higher extreme. The air speed for a given engine speed is an index of the fore-and-aft angle of the plane. It is evident from this that an air speed indicator is necessary to maintain the correct longitudinal attitude of the plane especially under conditions of poor visibility.

Actual size picture of new Pioneer air speed indicator.

Pioneer air speed indicators are made in three sizes of case, two of which are designed for mounting on instrument panels. The smaller model has a dial 2¾ in. in diameter, with an outside front mounting diameter of 3⅛ in. and was first produced this year. The older model has a dial diameter of 3¾ in. and an outside mounting diameter of 4⅛ in. For use on passengers in transport planes a third type has been developed with a 6 in. dial, which can be read at a distance of 12 to 15 ft. This is known as the giant size. The instruments for panel mounting are made in all ranges of speed from 0-120 to 0-350 m.p.h. and the Giant type indicates speeds from 0-160 m.p.h.

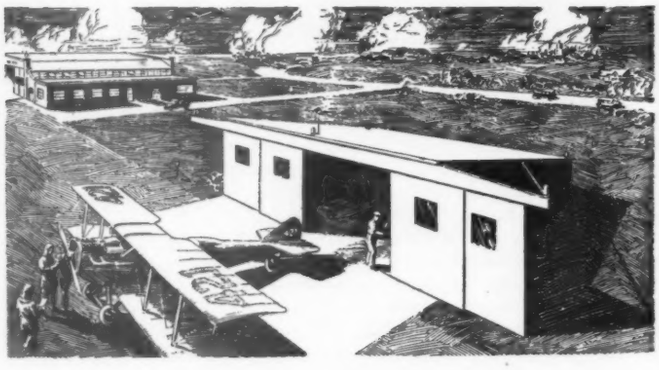
The weight of the small panel type instrument is 0.6 lb. and that of the large panel type is 0.7 lb. The Pitot-Static tube, which is usually mounted on one of the forward interplane struts, weighs 0.4 lb., and the connecting tubing 0.06 lb. per ft. Two special T's are supplied which may be used both for an intermediate tube connection (as at the junction of wing and fuselage) and as drains.

Austin Individual Hangars

The Austin Co., Cleveland, Ohio, builders of hangars, aviation buildings and airports for the industry, is now producing individual hangars for private owners. The company has had ten years of experience in designing and building large aeronautical structures and is well qualified for the work of providing small hangars for individual owners.

Two general types have thus far been developed and each type is made in three different sizes with spans of 36, 40 and 50 ft. One of the types designed the Bliss Hangar is "T" shaped and is therefore less expensive than the rectangular Euclid type. The latter however provides more space for repairs and other facilities at a slightly increased cost. It also can be built in multiple, where two or more planes are to be stored and one side wall or the partition wall can be omitted entirely.

All members used in the framework of these hangars are rolled structural steel sections, none of which are less than ¼ in. thick. The walls are 24 gauge corrugated galvanized steel sheets and the roof sheets are of 22 guage material. They are also corrugated to give strength and galvanized to prevent rust. The hangars are provided with easily operated sliding doors which are covered with flat galvanized steel sheets. They are suspended from a track by hangers fitted with frictionless roller bearing wheels and travel in a straight line. Doors are stayed at the bottom with steel guides. Provision is also made to lock the doors. All models are fire safe and weather tight and are designed to withstand a wind pressure of 80 m.p.h. when properly anchored.



Front quarter view of an Austin Individual Hangar.

Provision is also made for the easy removal of engines from planes by means of a 500 lb. capacity hoist which can be attached readily to a special member provided for

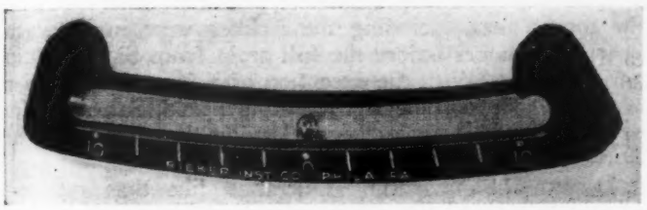
the purpose. Windows can also be provided so that the plane will not have to be taken out of the hangar when repairs are made.

Complete outline specifications, erection drawing, and material lists are furnished with each hangar. Proper marking of materials and detail plans assure quick and easy assembly. It is also a simple matter to dismantle, move and re-erect these hangars without loss.

Ceiling heights provide 10 ft. 6 in. of 11 ft. 6 in. clearance at the front of the hangars which is sufficient for most present day planes. Bliss hangars are made in sizes 36 by 26 ft., 40 by 30 ft., and 50 by 36 ft. Euclid hangars are made the same dimensions but in a different shape.

Rieker Inclinometer

THE BALL Type Inclinometer used in the U. S. Army Air service is now available for commercial and private use. The instrument is a ball type bank indicator made to the drawings and specifications of the Army Air Service by the Rieker Instrument Co., 1919 Fairmount Ave., Philadelphia, Pa. Like other Rieker instruments it



Inclinometer which registers departure from correct banking angle.

is constructed of the best materials and no effort has been spared to make it highly accurate and efficient. It has been standard equipment on Government planes for a number of years.

This instrument indicates accurately the lateral angle of inclination relative to the horizon and instantly registers the slightest departure from the correct banking angle in turning. It is six in. in length, weighs 2½ oz. and may be easily installed on the instrument board of any plane.

The inclinometer is furnished in two types, one of which has the graduations treated with luminous paint for night flying. The other type is not illuminated.

New Zenith Carburetors

IN LINE with the development of aviation for commercial use, the Zenith-Detroit Corp. has brought out the Zenith 70 series aviation carburetor. Since the war, when Zenith supplied all Liberty engine carburetors used in the majority of the fighting planes on the Allied front and on all British tanks and French Renault tanks, the company has kept closely in touch with aviation development, particularly through its French factory in the Continental field. Now that American manufacturers are putting their output of aviation engines on a production basis, it is prepared to supply dependable aviation carburetors at a price in keeping with commercial requirements.

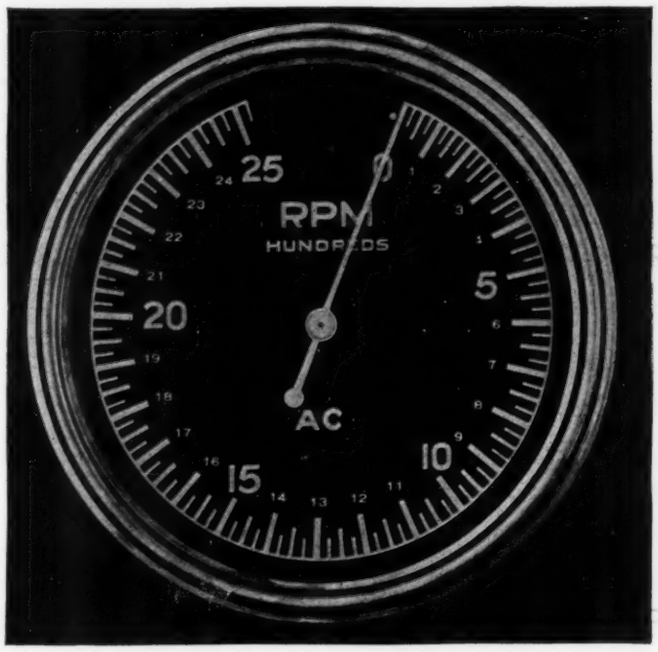
The distinctive feature of this new Zenith series is its concentric design, the mixing chamber being centered over the fuel bowl. This permits tipping at acute angles without affecting its operation, and insures dependable carburetion under all flying conditions except a continued upside down flight. A manually operated altitude correcting device is incorporated.

The Zenith 76AV is a 1½-in. carburetor and is being used by Velie, Szenkely, Le Blond and other builders. It is also made in 1¾-in. and 2-in. sizes.

A.C. Airplane Tachometer

AN AIRPLANE tachometer made in quantity production is announced by the AC Spark Plug Co. This instrument, developed several years ago, has been used on the winning cars in the last three Indianapolis races. During the season many thousands have been sold for marine use, and the recent marketing of a tachometer for outboard motors has given an added stimulus to production.

The tachometer head is of the magnetic type, compensated against temperature changes. There are only



Shielded magnetic tachometer which does not effect compass.

two moving parts, consisting of a light rotating armature, and a pointer mounted on sapphire bearings. Due to the complete shielding of the cadmium plated steel case, the tachometer has no detrimental effect on the compass. The dial is black, with white letters, and may be indirectly lighted. The bezel is brass, polished and then chromium plated. The instrument is assembled with a waterproofing compound, and sample instruments have successfully withstood a salt spray test of 150 hr., made to the specifications of the Bureau of Standards.

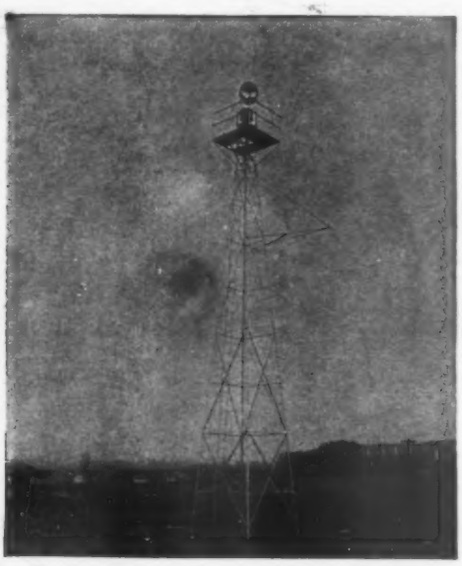
Ideco Airway Beacon Tower

THE INTERNATIONAL Derrick and Equipment Co. of Columbus, Ohio, and Torrance, Calif., whose Ideco galvanized structural steel airway beacon towers are used in the U. S. Air Mail Service, is in production on towers for all standard types of beacon light. The towers are made in several standard heights found by experience to be suitable to the requirements of most airport sites but

special sizes can be provided for installation under unusual conditions. Provision has also been made for the mounting of neon lights and other fog penetrating devices.

For general use the 51 ft. tower has been found to be the most suitable. Heights vary however from the short 20 ft. type, used on low level country to the 87 ft. type used under other topographical conditions. Towers of additional height to meet any requirements can be furnished and the company maintains a staff of engineers who will gladly assist in preparation of plans and specifications without obligation. International also supplies floodlight towers, ground light supports, radio towers, mooring masts, bangars and other types of buildings needed for airport or airway.

Ideco towers are specially constructed to resist high winds and storms. They are protected against weather, rust and corrosion by hot dip galvanizing and are fire and lightning proof, these qualities being essential for a structure of this type. All members have been standardized and are built over jigs and dies insuring absolute



Beacon mounted on an Ideco Tower.

interchangeability and eliminating all cutting or fitting in the field. Ease of erection has been stressed on account of the many out of the way locations where transportation and erection are difficult.

Only the best quality of structural steel is used conforming to the specifications of the American Society for Testing Materials. Hot dip galvanizing after fabrication eliminates the possibility of rust and corrosion attacking exposed surfaces.

Erection is further simplified by drawings furnished with each tower showing foundation plans and erection details. All members and parts of the structure have erection numbers permanently stamped into the steel. These numbers are clearly indicated in the plans. For locations where electric power is not available towers are furnished with small metal houses built in their bases to accommodate electric lighting plants or acetylene tanks.

Ideco towers have been specified for thousands of miles of the lighted airways by the Department of Commerce and are also used on privately owned airports. Further information will be furnished upon request by any of the company's offices in New York, N. Y.; Tulsa, Okla.; Dallas, Tex.; Houston, Tex.; Shreveport, La.; Detroit, Mich.; Columbus, Ohio, or Torrance, Calif.

With the National Air Tour

(*Continud from page* 261)

still is a waypoint for planes going over the southern route to or from Arizona or California. Because of its distance from San Antonio some of the entries were compelled to land at Dryden, enroute, for gasoline. After enjoying a lunch served at the airport, the pilots took off on the 171 mi. jump to El Paso, arriving there in mid-afternoon.

Beat Express by Two Hours

One incident of the two legs between San Antonio and El Paso being worthy of mention because of the way it points out the advantages of air travel is this: A fast passenger train leaves San Antonio for El Paso every morning about 3:30. The tour planes passed this train during the forenoon, the Army Fokker, which took off from Duncan field at 10:30 A. M. passing it just before it got into Alpine. Because of the altitude two of the passengers in the Fokker and all of the baggage were placed aboard the train when it drew into Marfa, the Fokker departing approximately one hour later. All of the tour planes, including the Fokker were in El Paso nearly two hours before the fast train from San Antonio arrived there. With the exception of a few of the slower planes, which took off from Winburn field, San Antonio, at 6 A. M., the entries began leaving the Alamo city at 8 A. M.

Despite the navigating difficulties, like the first hop of the day, all of the entries made perfect scores on the flight to El Paso. The landing there was made at Fort Bliss, and witnessed by an exceptionally large crowd. Due to the intense heat, perhaps, some of the pilots had slight trouble enroute with their engines, but managed to get in in their allotted time.

Plane Loads Rechecked

A drive about the city of El Paso and a visit to the Mexican city of Juarez, across the river, comprised the entertainment program in El Paso, since that city was but an overnight stop on the route. Plane loads were rechecked the following morning before the entries took off on the 11th leg of the tour, a 263 mile flight to Tucson, Ariz.

The scores of the first 10 competitors at El Paso stood as follows:

Position	*Plane and Number*	*Pilot*	*Score*
1	Waco 18	Wood	8,304.6
2	Ford 2	Hawks	6,828.2
3	Stinson 21	Page	6,590.2
4	Stinson 20	Stinson	6,434.8
5	Waco 19	Meyers	6,326.7
6	Ryan 10	Henley	6,034.2
7	Stinson 22	Braun	6,004.7
8	Bellanca 1	Brock	5,774.5
9	Ryan 16	Breeze	5,356.5
10	Lockheed 23	Kantwell	5,215.4

The flight to Tuscon from El Paso began at 9 A. M. on July 10. Twenty two planes made the trip. Travel Air, number 14, piloted by George Peck, was unable to start because of magneto trouble. In as much as Tucson is Peck's home town it was particularly unfortunate that he could not have been among the fliers that hove through the pass in the Rincons and landed in the Tucson municipal airport. Whether or not Peck eventually repaired his engine and plans to rejoin the tour, was not known when the tour arrived in San Diego the following afternoon.

Monocoupe, number 29, being flown by Mrs. Omlie

for the first time, was compelled to turn back for a carburetor adjustment after getting approximately 50 miles out of Fort Bliss. Following the adjustment she again started for Tucson, arriving there at 1 P. M. Because of her trouble she had the distinction of being the only pilot not to annex a perfect score on the El Paso-Tucson leg.

The standing of the first ten at the completion of the leg remained the same, in so far as position is concerned, as it had been before the leg.

In Tucson the fliers were greeted during the afternoon by a severe sand storm, which would have done considerable damage to the planes had the natives with knowledge of the whims of their climate, not had the foresight to stake them down stoutly. Several of the fliers drove to the airport, took their planes into the air and rode out the storm in their natural element.

All Make Perfect Scores

On the evening of July 10 the tour personnel were guests of the city's reception committee at the Tucson Country Club. The planes took off the following morning for San Diego, with a noon day stop scheduled at Yuma, Ariz. All of the planes made the 213 mile hop from Tucson to Yuma with perfect scores except the Travel Air flown by Kelly, the Curtiss Robin, piloted by Robertson and the Eagle Rock flown by Clevenger. Kelly experienced carburetor trouble in Tucson and was late starting.

In flying over the legs between San Antonio and the coast the pilots, as a rule, flew as low as the mountains and the intense heats would permit in order to avoid the decreased efficiency of the upper air. Although the flying field at Yuma was said to be just at sea level, the lowest stopping point on the tour route, the heat there was not as noticeable as that in Tucson. This, perhaps, was due to the time of day, the visit being just before noon.

Lunch was served on the field at Yuma, after which the contestants took the air for the final jump of their journey to the coast. On this final leg, 136 miles in length, the planes crossed the Colorado River and nosed westward over the great white sand desert and California's famous Imperial Valley, a flight that took them over many miles hundreds of feet below sea level. And it was a gladhearted bunch of pilots and passengers that hove over the top of that great mountain range bordering Imperial Valley on the west, breathed deeply of the cool Pacific Ocean air, and glided gently down to rest on the Mahoney field at San Diego. With the single exception of Stinson, number 21, piloted by Page, all of the entries made the leg with perfect scores.

With the arrival at San Diego more than one third of the 6,300 miles of the tour route had been covered; one of the two really trying stretches of the long route had been traversed—the hot desert and mountain country between San Antonio and the coast range; and 22 planes of the 25 that left Detroit on June 30 were still in the contest. Entry number 4, an Eagle Rock biplane, piloted by Benny Howard, and powered by a 260 horsepower Menasco-Salmson engine, dropped out of the tour in Oklahoma, when his engine, for which he was unable to get parts, went bad on him. The second plane to be left behind was the Monocoupe, number 26, and flown by Mrs. Omlie, which was washed out in a ground loop on the Marfa flying field. The third entry not now with the tour was the Travel Air biplane, Ryan-Siemens nine powered, that Peck was unable to start at El Paso. As already stated Mrs. Omlie now is flying Monocoupe 29, formerly piloted by Jack Atkinson, and there is some possibility that Atkinson may finish with the repaired number 26.

Peck also is expected to catch up with and rejoin the touring cavalcade as soon as possible. A fourth plane, a Waco, powered by a Fairchild-Caminez engine, and flown by M. Gould Beard, was left behind in Indianapolis when his propeller was placed on Travel Air number three, another Fairchild-Caminez engine entry, rejoined the tour at Tulsa and now is back in the line up. Scores on the Waco entry have not yet been definitely computed.

Approximately 65 persons, including pilots and passengers, had been transported over the 2,611 mi. between Detroit and San Diego in approximately 28 hours flying time. This with but 7 unscheduled landings and damage to but two planes.

In San Diego a dinner was given in honor of the visiting air travellers at El Cortez hotel, at which B. F. Mahoney presided. A big crowd had witnessed the arrival of the aerial caravan and a fair sized crowd watched the departure of the planes on the following morning, July 12, when the tour took off on the 113 mi. flight to Los Angeles.

Eighth Forced Landing Made

This leg proved the most pleasant of any experienced thus far along the route. Hugging the shore line the fliers saw below them on one side the nicely appointed beach cities of the Southern California coast and on the other side the deep and limitless blue of the Pacific Ocean. At Long Beach the planes turned inland and cross-countried to Mines Field at Inglewood, where approximately 15,000 persons were waiting to greet them. The San Diego-Los Angeles leg, the fourteenth of the tour, saw the eighth forced landing, Mrs. Omlie landing her tiny plane on the sand at Laguna Beach because of engine trouble. Mrs. Omlie and Cleveland, pilot of Ryan number nine, were the only pilots who failed to register perfect scores for the leg. Cleveland was delayed at the start in San Diego.

The two day stop-over in Los Angeles was featured by an entertainment program including a barbecue, a dinner at the Uplifters Club, a luncheon at a movie studio and a swimming party at one of the many beaches adjacent to the city.

With little more than half the 6,014 mi. route completed, and 16 of the 31 cities exclusive of Detroit, to be visited behind them, 22 of the Tour planes arrived at Mills Field, San Francisco, July 14. John P. Wood, pilot of entry number 18, a Waco biplane, at the halfway point was continuing to broaden the lead he took at the start of the Tour. Wood's score, 13,407. was 1,789. more than that of his closest competitor, the Tri Motored Ford, flown by Frank Hawks, with 11,618. The Ford entry was far ahead of the holder of third place. The remainder of the scores at San Francisco were as follows:

Position	Plane and Number	Pilot	Score
3	Stinson Jr. 21	R. G. Page	10,741.7
4	Waco 19	Charles Meyers	10,635.9
5	Stinson 20	Eddie Stinson	10,473.4
6	Stinson 22	Bruce Braun	9,786.5
7	Bellance 1	Billy Brock	9,502.9
8	Ryan 10	Al Henley	9,326.1
9	Ryan 16	Vance Breese	8,910.9
10	Lockheed 23	Lee Schoenhair	8,510.1
11	Buhl 8	Louis Meister	8,469.7
12	Fairchild 24	R. W. Pears	7,772.9

13	Travel Air 3	J. N. Kelly	7,572.8
14	Bellance 25	George Haldeman	7,475.0
15	Swallo 17	M. V. Aavang	6,748.8
16	Buhl 7	Alger Graham	6,555.7
17	Stearman 6	Deed Levy	6,350.4
18	Eagle Rock 12	C. P. Clevenger	5,397.7
19	Monocoupe 29	Phoebe Omlie	4,908.25
20	Waco 28	M. G. Beard	4,908.2
21	Ryan 9	E. W. Cleveland	3,792.7
22	Curtiss Robin 5	Dan Robertson	3,341.2

On the day that brought them to Frisco, the pilots completed two legs of their route; one from Los Angeles to Fresno and another from Fresno to Frisco. The first leg, 212 mi. long, took them over the lofty mountains north of Los Angeles, and across the hot San Joaquin Valley to the municipal airport at Fresno. All but two of the contestants, Cleveland and Henley, flew the leg with perfect scores. Cleveland was delayed in Los Angeles with a broken rudder and Henley experienced engine trouble. In Fresno the tour personnel was taken to Roeder Park where lunch was served them.

Held Up By Tire Trouble

On the take off from Fresno two of the entries, the Lockheed and the Curtiss Robin, were held up by tire trouble on the Fresno field. These two planes and the Ryan piloted by Henley, were the only entries failing to score perfect marks on the hop into Frisco. Henley again suffered from motor difficulty.

On this latter jump the fliers again found it necessary to climb to a comparatively high altitude in order to get over the coast range mountains bordering San Francisco Bay. The mileage was 150 mi.

Because of the illness of his wife, Bob Cantwell, pilot of the Lockheed, retired from the contest in Los Angeles, and relinquished the controls of his plane to Lee Schoenhair, former air mail pilot, who recently attempted a non-stop flight from coast to coast in the same make of plane.

It was understood in San Francisco that Jack Atkinson, pilot of the Monocoupe number 29, now being flown by Mrs. Phoebe Omlie, had superintended repairs on Monocoupe 26 and was flying over the Tour course and soon would rejoin the party. No word has been received from George Peck, flying Travel Air biplane number 14, who was left in Tucson, with magneto trouble. When Atkinson rejoins the tour 23 of the original 25 will again be in the contest, vieing for the Edsel B. Ford reliability trophy and a total of approximately $15,000 in prize money.

From Frisco the touring planes still have 2,928 mi. to go before returning to Detroit, July 28. After a two day stop they were scheduled to leave Frisco on July 16 for Portland, Oreg. with two intermediate stops, one at Corning, Calif. and one at Medford, Oreg. the greatest mileage covered on any one day of the tour itinerary.

The following is the official passenger list at the start of the Tour:

Plane No.

1. *Bellanca—William S. Brock, pilot; Edward F. Schlee, R. C. MacDaniels, James V. Piersol.*
2. *Ford tri-motor—Frank M. Hawks, pilot; P. J. Clausen, mechanic; Mrs. Hawks, Mrs. Bert Hull, C. A. Lupole, S. A. Carlson, Harvey Campbell.*
3. *Travel Air—J. N. Kelly, pilot; William Stockert, mechanic.*
4. *Eaglerock—Benny Howard, pilot; Frank Free, mechanic.*
5. *Curtiss—Dan R. Robertson, pilot.*
6. *Stearman—David P. Levy, pilot; W. P. Innes, Jr.*
7. *Buhl—Alger Graham, pilot; Ray Cooper, Mrs. Cooper.*
8. *Buhl—Louis G. Meister, pilot; Harry Dunn, mechanic.*
9. *Ryan—E. W. Cleveland, pilot; Norman Siegel, Robert Nesbit, J. F. Wallace.*
10. *Ryan—Al Henley, pilot; V. N. Johns, mechanic.*
11. *Out.*
12. *Eaglerock—C. P. Clevenger, pilot; J. A. McInaney.*
13. *Out.*
14. *Travel Air—George B. Peck, pilot; Craig Smith.*
15. *Out.*
16. *Ryan—Vance Breese, pilot, J. T. Turst, L. O. Gunther.*
17. *Swallow—Melvin V. Aarang, pilot; Clarence W. Helm, mechanic.*
18. *Waco—John P. Wood, pilot; Frank Clewers.*
19. *Waco—Charles W. Meyers, pilot; Thomas Colby, William Baldwin.*
20. *Stinson-Detroiter—Eddie Stinson, pilot; Mrs. Stinson, Lloyd Stone, John C. Day, W. E. Barton.*
21. *Stinson, Jr.—Randolph G. Page, pilot; Otto Leisey, A. S. Christianson.*
22. *Stinson—Bruce Braun, pilot; G. D. Lowers, mechanic.*
23. *Lockheed—R. W. Kantwell, pilot; Eddie Cooper, mechanic.*
24. *Fairchild—Richard W. Pears, pilot; William LaViolette, mechanic; John T. Nevill.*
25. *Bellanca—George W. Haldeman, pilot; Marion Sterling, P. J. Boedecker, Harry Haute.*
26. *Monocoupe—Phoebe Fairgrave Omlie, pilot.*
27. *Out.*
28. *M. Gould Beard, Pilot.*
29. *Monocoupe—Jack Atkinson, pilot.*

The tour is preceded on every hop by an Army Douglas O-2 plane, carrying Capt. Ray Collins, tour referee, and Capt. R. G. Breene, assistant referee. The tour is followed on every hop by a three-engine Fokker transport, also loaned by the Army and used as the tour's "flying press room." This plane is piloted by Lieut. Frank B. Tyndall, with Staff-Sergt. John S. Carden as mechanic. Passengers are Foye Shumaker, Arthur G. Schlosser, William J. Dunn, Frank Bogart, Hugh C. White, A. G. Andrus and Harvey Klemmer.

The Pacer Monoplane

(*Continued from page 262*)

duction plane construction the entire fuselage, center section, and tail group are built of welded steel tubing and all bays are double braced at the junction of the welds. The longerons are telescoped at two points with gusset plates welded into the tubing at these points. From the tail to the rear of the after cockpit ⅞ 20 gauge tubing is used. This is telescoped into one inch 18 gauge material which runs to a point between the cockpits. The

Rear quarter view of the Pacer Monoplane.

remainder of the longeron is of 1⅛ in. 18 gauge tubing. The turtle back is constructed of spruce fairing mounted on steel tube frames. The weight of the uncovered fuselage is 109 lb.

One remarkable accessibility feature of the Pacer is found in the method of attaching the engine mounting to the fuselage. The mounting is entirely of steel and is hinged to the fuselage in four places. By removing two huge pins on either side, the engine may be swung to the opposite side to make repairs and adjustments in the rear. All metal parts are protected by two coats of

specially prepared primer and finished with a preparation to prevent rusting.

The wing construction is conventional with plywood ribs and solid spars covered with fabric and finished with five coats of Du Pont dope and three coats of Murphy Aircraft Lacquer. The spars are attached to the center section by double pin hinges increasing the rigidity and giving the effect of a continuous spar. Two streamline struts support each wing panel and have an airfoil section capable of lifting their own weight at 72 m.p.h.

The only wire bracing is between the center section struts, where four Hartshorn streamline wires are employed. Ailerons are of the fish type, hinged at the top and controlled by cables. The total weight of each wing panel is 121 lb.

Fuel tanks are built into the wings and center section and have a total capacity of 72 gal. The wing tanks are constructed in a perfect airfoil section and have a capacity of 15 gal. each. The cruising range is about 750 mi. All fuel lines lead to a Lunkenheimer in the after cockpit within easy reach of the pilot.

Landing gear is of the split type with the shock cord wrapped in tension. It is of rugged steel tube construction and weighs 89 lb. A tunnel type radiator is used in the Hispano and other water cooled installations.

While the color of the plane is optional all constructed to date have been finished in maroon above the top longerons including the wings and black below, with a gold stripe as the dividing line.

The manufacturer's specifications are as follows:

Length overall	22 ft. 9 in.
Height	8 ft. 7 in.
Wing span	36 ft. 6 in.
Wing cord	5 ft. 6½ in.
Wing Area	200 sq. ft.
Service ceiling (Whirlwind)	21,000 ft.
Service ceiling (Hispano E 4)	18,000 ft.
Landing speed	42 m.p.h.
Climb (Whirlwind)	1650 f.p.m.
Climb (Hispano E 4)	1500 f.p.m.
Maximum speed (Whirlwind)	147 m.p.h.
Maximum speed (Hispano E 4)	138 m.ph.
Cruising speed (Whirlwind)	120 m.p.h.
Cruising speed (Hispano E 4)	110 m.p.h.
Useful load	1200 lb.
Gasoline capacity	72 gal.
Cruising radius	750 mi.

The Fowler Variable Area Wing

(*Continued from page* 263)

hinged or flexible. It is rigid in its entirety although free to move in a direction parallel to the line of flight. Resistance to controlling the movement of the auxiliary wing is due to sliding friction of the rollers and to the drag, it is not subjected to the direct lifting forces. Control forces are practically nil at the control handle when operating the auxiliary wing. The auxiliary airfoil occupies only that portion between the ailerons.

The normal wing is of conventional wood construction from the nose to the rear beam. Front and rear beams are of the box type. Fabric cover is used from the nose to the rear beam. The trailing portion is recessed on the under side to permit the auxiliary surface to fit snugly in position when closed, and is covered with plywood top and bottom. The auxiliary surface has one solid spruce beam, and is covered with plywood. Three solid duralumin supports are secured to the rear beam at the strut joints. A trolley composed of three steel rollers, one on top and two on the lower side slides freely over the duralumin supports. The trolleys are secured to the single beam of the auxiliary wing. The controls are continuous cables and lead to the control drum inside the wing, and directly over the operator's cockpit. Four complete turns of the handle moves the auxiliary wing positively, slowly and easily through the entire flying range. The location of this control unit can be extended to the pilot's cockpit. The usual ailerons are provided. Complete static tests of the auxiliary wing supports, main trailing surface and internal cross bracing were made prior to starting construction, and all gave load factors far exceeding the requirements for the main wing structure.

Aerodynamic Properties

Its aerodynamic characteristics were tested in the wind tunnel of the Guggenheim School of Aeronautics at New York University. With the auxiliary wing in extended position the properties of the normal wing of ordinary characteristics were increased to a maximum Ky of

Three-quarter rear view of JN-4 fuselage showing the Fowler Variable Area Wing in normal position.

.00579 at 14 deg. for the normal wing chord. Its L/D is 14.8. The model provided for full aileron control surfaces. The increased area is about 25 per cent. Based on the normal area the lift is increased about 100 per cent.

Lateral Control at Stall

One of the most important features of this wing is the effectiveness of aileron control beyond the stalling angle with the auxiliary wing extended. Under extreme circumstances such as engine failure occurring shortly after leaving the ground the extended wing presents an unusual solution to this problem. The stalling angle of the wing extended is about 14 deg. The stalling angle of the normal wing is over 17 deg. Since the ailerons are a part of the normal chord the range of maximum aileron effectiveness is from 3 deg. to 4 deg. above the stall angle of the extended wing which should be sufficient to prevent the initial turning tendency. This is an inherent feature obtained without further structural complication.

Full Scale Tests

The wing was designed for a VE-7 airplane of 2200 lb. gross weight and a load factor of 8. As a VE-7 was not available a Canuck was used. The Fowler wing was 30 lb. lighter than the original wings which weighed 405 lb. and had a load factor of about 5.5. The total gross weight was 1910 lb. A wing properly designed for the Canuck, or similar light plane, would have resulted in a saving of at least 100 lb. Original wing area 353 sq. ft. Fowler Wing, normal, 136 sq. ft., extended 166 sq. ft. The Flight Tests were made by Wesley Smith at the Pitcairn Field, Philadelphia.

With a full load the Canuck with this new wing took off in nine seconds in practically still air and stopped in 10 sec. Its take off speed was almost identical and when

timed over a measured course gave 94 m. p. h. as compared with 74 m. p. h. for the original Canuck. And this in spite of improper propeller, no streamlining, and a faulty engine. These ordinary refinements should improve the speed to at least 100 m. p. h. Rate of climb was about 260 ft. per minute and increased as the auxiliary surface

Fig. 2. Fowler wing in extended position, showing simplicity of installation.

was retracted. No adjustment was made to the stabilizer, and it was found to be possible to fly hands off with the auxiliary wing fully extended or wholly inclosed. Lateral control appeared to be as effective as any good conventional ailerons would be. The above data are the results of numerous trials.

Practical Application

The importance of the wing to the present day airplane is its ability to carry greatly increased pay load. It is possible to double the pay load for a conventional airplane for about the same performance which will reduce the cost per pound to one-half. It will enable doubling the gasoline capacity and the speed range which improves the possibility of extremely long flights and long endurance tests.

The wing will also permit an airplane to be designed which will perform equally as well as a larger plane of 30 per cent more power, i. e., a plane of 150 h. p. with this wing could be made to perform as well as a plane of 200 h. p. of the same flying range and pay load.

How to Splice a Wooden Wing Beam

(*Continued from page* 259)

three and a half or four hours. A new batch of glue should be made in the morning and another at noon. The mixing pots should be carefully cleaned before the new glue is made, all of the old mixture being thrown away.

In routed beams, the routing should stop within an inch of either side of the splice. In box beams, reinforcing strips, half as thick as the flanges should be supported from the opposite flanges by vertical diaphragms one-half inch thick, spaced six to ten inches apart with the grain vertical. The centers of the scart joints in the opposite flanges should be not less than 24 in. apart. A typical splice is shown by Fig. 2.

Splices in the plywood webs should be backed by doubling strips of the same material, glued in position and extending beyond the edges of the joint at least one inch.

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In routed beams, the joints should be made with wooden strips and bolts, no glue being used since the glue available would not be suitable and the workmen inexperienced. The routed portion should be filled in with blocks. Strips

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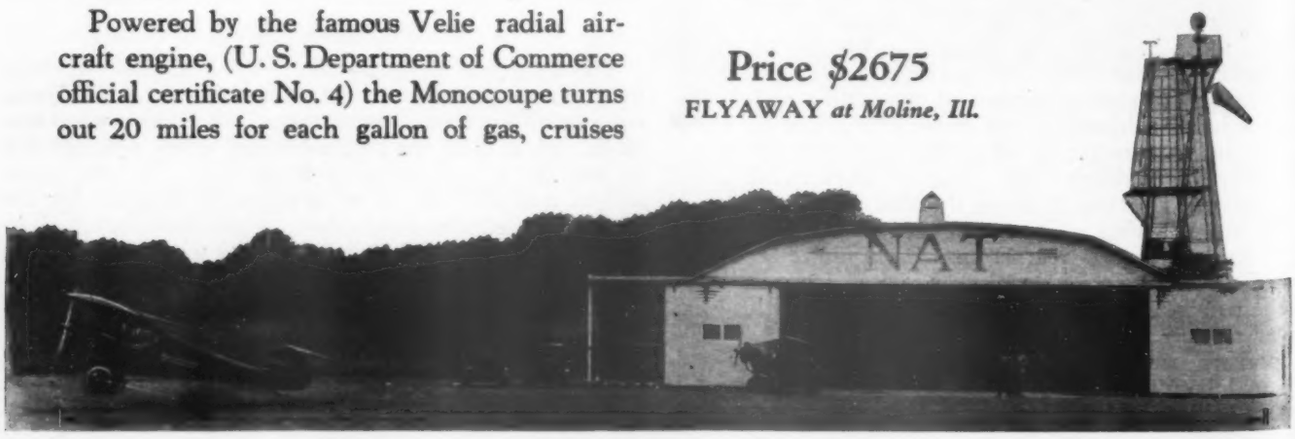

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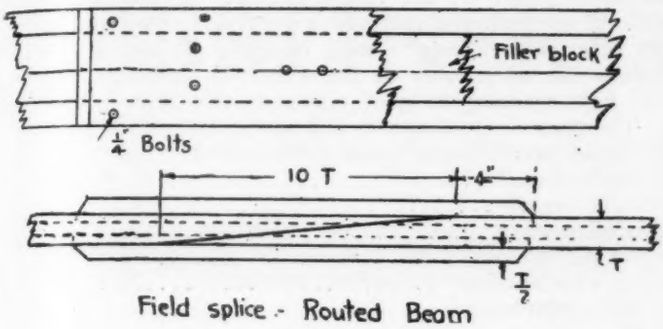
of hardwood or spruce, the full depth of the beam and half as thick as the flanges of the beam should be secured on each side of the scarf joint by 10 or 12 quarter-inch bolts, two bolts on each end going through the flanges.



Field splice - Routed Beam

Fig. 3.

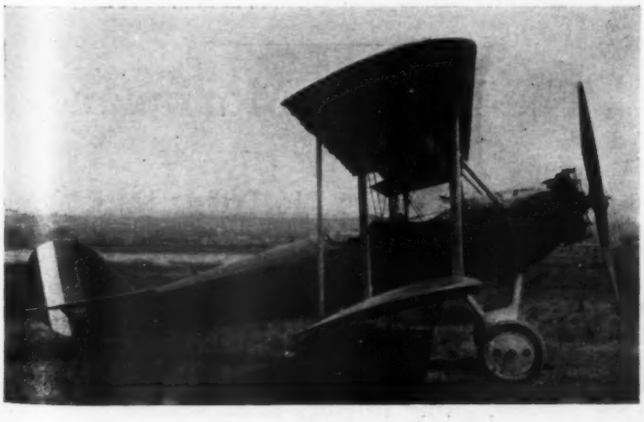
The strips should extend at least four inches beyond the ends of the scarf joint. A typical splice is shown in Fig. 3. It is believed that broken box beams should be spliced at an airplane factory.

The Boeing Model 81

(*Continued from page* 260)

satisfactory since the disposable load is closely concentrated about the center of gravity. The engine mount is detachable and is constructed entirely of steel. Incorporated in the landing gear is the Boeing Oleo unit of the type used on the Boeing mail planes and PW-9's. The tail skid is non-steerable and is mounted directly on the tail post.

As the plane has been designed for instruction purposes dual controls are provided. When private or commercial work is being done the controls in the forward cockpit may be removed. Pulleys have been entirely eliminated



Side view of the Boeing Model 81.

from the rudder and elevator controls, making them simple and foolproof. The use of Ahrens units provides smoothly operating engine controls. A hand inertia starter is included and its clutch may be operated from the rear cockpit when the engine is to be started by one person.

A complete set of flying instruments, as required by the Department of Commerce, is installed in the rear cockpit. All necessary engine instruments are provided in both cockpits. Included in the equipment are fire extinguishers of both the pressure and hand types.

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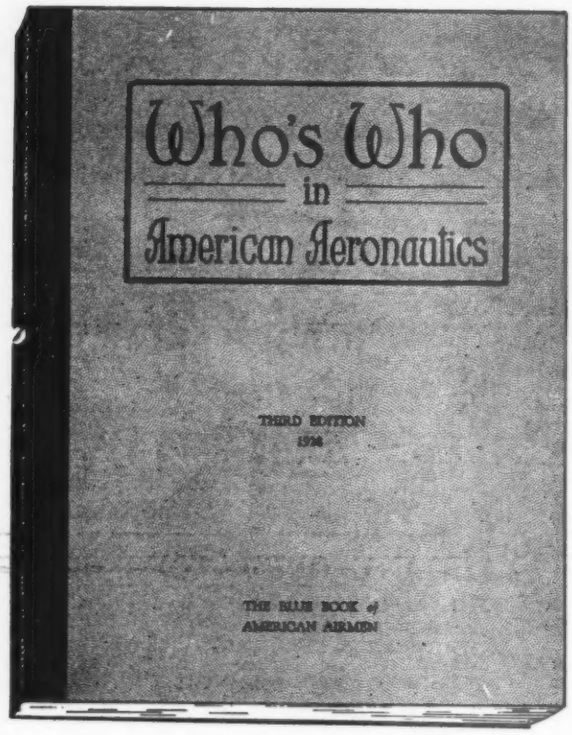

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The general specifications and performance as found by the Navy acceptance tests are given below:

Length overall	25 ft. 8 in.
Height overall	9 ft. 10 in.
Airfoil section	N-22
Span (upper wing)	35 ft. 0 in.
Span (lower wing)	33 ft. 6 in.
Chord (both wings)	56 in.
Gap	65 in.
Stagger	14 in.
Incidence	0°
Area wings, total	295 sq. ft.
Area of Ailerons	29.6 sq. ft.
Area of horizontal stabilizer	19.3 sq. ft.
Area of elevators	15.4 sq. ft.
Area of fin	3.5 sq. ft.
Area of rudder	10.8 sq. ft.
Weight empty	1,555 lb.
Useful load	630 lb.
Gross weight	2,185 lb.
Power plant—Fairchild Camines	135 hp. at 1,000 r.p.m.
Wing loading	7.4 lb./sq. ft.
Power loading	16.2 lb./hp.

FULL LOAD PERFORMANCE

High speed at sea level	103 m. p. h.
Cruising speed (895 r. p. m.)	85 m. p. h.
Landing speed	45 m. p. h.
Climb at sea level	635 ft./min.
Climb to 5,000 ft.	9 min.
Climb to 10,000 ft.	23½ min.
Service ceiling	14,800 ft.
Absolute ceiling	17,600 ft.
Gasoline capacity (normal)	30 gal.
Range at cruising speed	370 mi.
Endurance at cruising speed	4.5 hr.

The Berliner Monoplane

(*Continued from page* 258)

the spinner. For cowling, Mr. Berliner has employed aluminum, .040 thick and designed somewhat after the Travel Air OX system, with hinges down the center enabling inspection of the interior, first from one side and then the other as with an automobile.

Underneath the engine bed is the under-slung radiator. In order to eliminate ignition troubles as far as possible, Mr. Berliner has installed another set of spark plugs in each cylinder, giving 16 plugs in all and has added an Atwater Kent battery type ignition system to supplement the magneto. For battery, a special gellatin type has been installed, made specially to the Berliner company's order. The engine has a Stromberg gas filter and the gas line is of flexible metal hose.

Between the engine and the passenger cockpit is the gasoline tank, so designed and installed that it may be removed without disturbing any other part of the plane's construction, streamlining or covering. The passenger cockpit is exceedingly large and comfortable, being 29 in. wide and offering ample convenience for long trips. It

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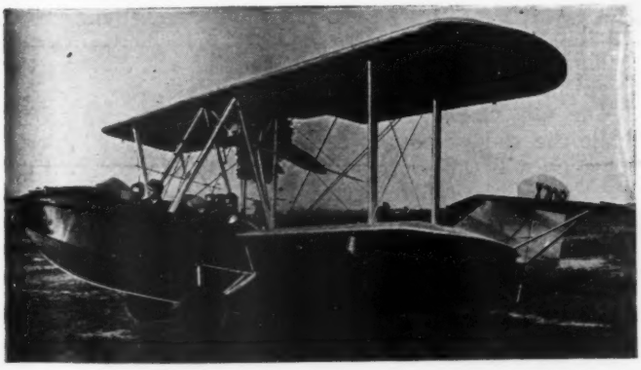

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is protected by a semi-circular wind-shield running up to the wing and offering complete protection from driving rain. Owing to this large and efficient wind-shield, the pilot's cockpit, immediately behind, is left uncovered as he is afforded excellent protection from the slipstream.

The dual control feature in the front cockpit makes it necessary for only one occupant to be in that section of the plane when instruction is being given or when the passenger has arranged to take over the plane in the air. The stick is removable, the pedals may be fastened out of sight and the cockpit can be converted instantly into a passenger and baggage compartment. A safety belt is standard equipment.

The pilot's cockpit behind has been given a reinforcement around the cowling which is designed to abolish the constant breaking and cracking of the edges due to pressure being exerted on it by the pilot on entering and leaving the plane. The reinforcement has been worked into the fuselage construction with welded tubing. The instruments in the cockpit include a Pioneer magnetic compass and the following Consolidated instruments: tachometer, altimeter, air speed indicator, oil pressure guage, and water temperature guage. In addition to the conventional control system there is a lever for adjusting the stabilizer from the cockpit and a safetybelt and fire extinguisher.

Front view of the Berliner OX-5 Monoplane.

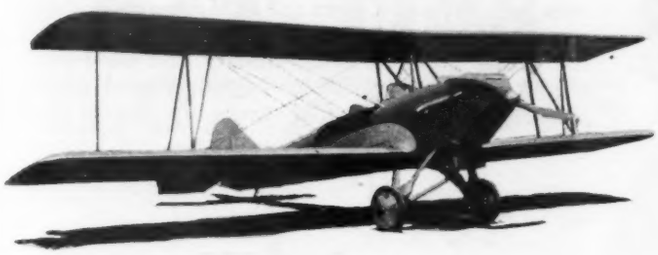
The tail surfaces are of chrome molybdenum tubing while the rudder post is of substantial steel tubing construction. The flippers and rudder are balanced. At the junction of the tail surfaces with the longerons, there is an opening covered with an easily removable celluloid inspection plate. The size of the opening is sufficient to give adequate visual inspection of the stabilizer and flipper fittings. The flippers are controlled through a push and pull rod while the rudder is operated by means of wires enclosed inside the fuselage and emerging a few inches from the rudder post.

The tail skid is a leaf spring type, easily replaceable from the outside by connecting with the short section of steel which has been welded to the substantial tail post.

The wing section employed is the Gottingen 398, of the type used by the Glenn L. Martin Co. on "Martin 74" and the Douglas Company on the Douglas torpedo plane. Of cantilever construction, the wing is held to the fuselage on each side by a tri-pod strut without adjustment and a rear strut adjustable to change the angle of incidence or for rigging purposes. These struts are stream-lined chrome-molybdenum steel. The front drag strut connects to the engine bed.

The landing gear is of the split type and the shock-absorbing employment is spring and Oleo gear. All strut fittings are external, have a high safety factor and are capable of standing under great wear. The wheels are wire covered with metail streamlining.

The wing is equipped with Friese type ailerons operated through torque tubes and push rods. Their connections are visible at all times. In constructing the wing, Mr.



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Challenger OX-5 is manufactured under Approved Type Certificate No. 19. Price $3100 at factory, complete with instruments. Complete, but less engine, $2400. Prices subject to change.

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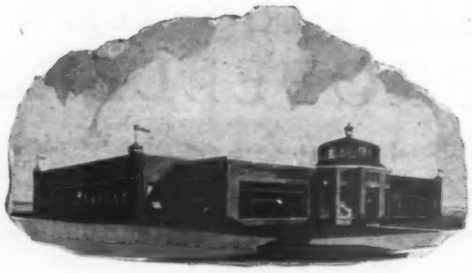

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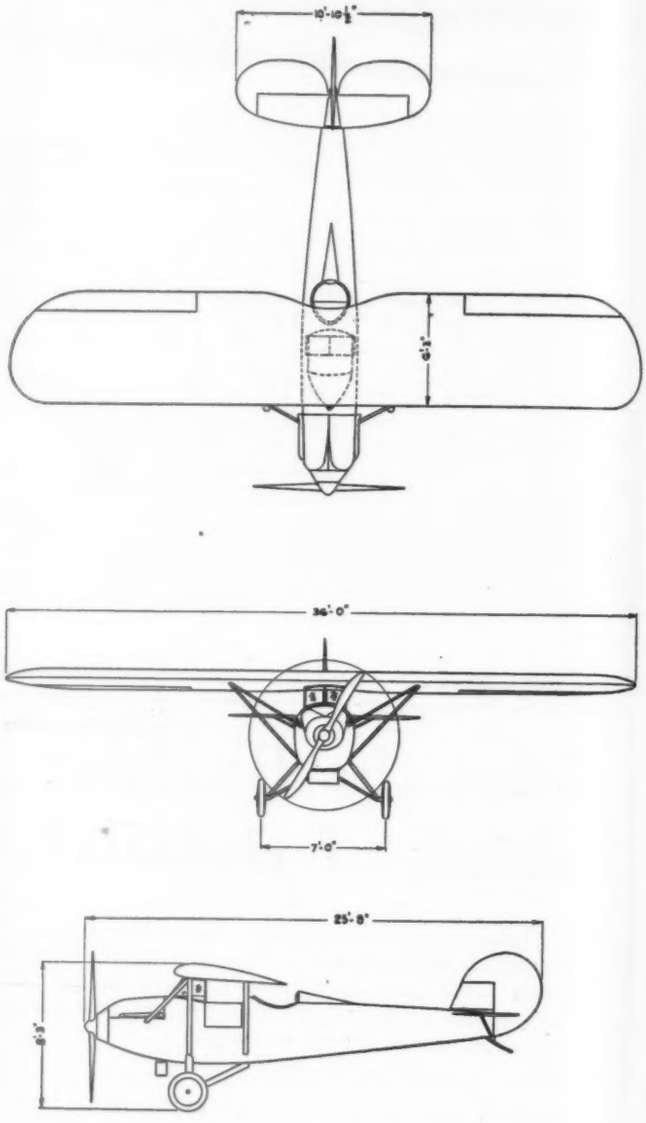
Berliner has employed box spars with spruce cap strips and one-eighth inch double-diagonal mahogany sides with one-half inch spruce bulkheads at five and a quarter inch intervals. The two spars are solid where the wing fittings go through. Double drag wires in two planes are provided for giving great torsional rigidity and eliminating wing flutter. The leading edge is of spruce routed out. The ribs are of bass wood webs and spruce cap strips. Casine water-proof glue is used throughout and Flight—ex fabric is employed. The plan has a standard finish of aircraft Berryloid in cream for the wing and tail surfaces and maroon for the fuselage.



Three view drawings of the Berliner Monoplane.

The specifications are as follows:

Length overall	25 ft. 2 in.
Height overall	8 ft.
Airfoil (wing section)	Gottingen 398.
Span	26 ft.
Chord	6 ft. 3 in.
Area wings, including ailerons	219 sq. ft.
Area of ailerons	17 sq. ft.
Area of horizontal stabilizer	13½ sq. ft.
Area of elevators	18½ sq. ft.
Area of fin	4 sq. ft.
Area of rudder	10 sq. ft.

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Weight empty	1380 lb.
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Wing loading	10.5 lb. per sq. ft.
Power loading	24½ lb. per hp.
High speed (full load, sea level and in level flight)	105 m. p. h.
Cruising speed	90 m. p. h.
Landing speed	41 m. p. h.
Absolute ceiling	10,000 ft.
Gasoline capacity	40 gal.
Range at cruising speed	400 mi.
Endurance at cruising speed	4 hr.

The Berliner Corporation was organized about two years ago, but the articles of incorporation did not mark Mr. Berliner's first venture in aeronautics. With his father, Emile Berliner, noted inventor and holder of many patents on the telephone and phonograph, he had experimented with helicopters, after his graduation from the

Front quarter view of the Berliner Monoplane with an OX-5 engine.

Massachusetts Institute of Technology and from a special course at Harvard University. The elder Berliner, builder of the Gyro aircraft engine back in 1911, had conducted experiments with aircraft before the Wright Brothers made their first flight.

In April of last year, Mr. Berliner organized the Potomac Flying Service, Inc., giving Washington its first up-to-date, modernly-equipped and operated commercial aviation. He leased Hoover Field from the Philadelphia Rapid Transit Company and this site, about 10 minutes from the center of the city, has proved very attractive for flights to thousands of tourists as well as local residents. In all the flying throughout summer and winter, not one fatal accident has occurred to a passenger

It is Mr. Berliner's intention to eventually equip his flying service with planes turned out of the Berliner factory 10 miles away. Through the operation of various commercial types, in the rigid routine of "hop" flying, Mr. Berliner feels he has obtained much valuable knowledge on the construction of airplanes for "hard work," and has applied his findings in this respect to the Berliner monoplanes. Two of the OX jobs are in service at the field at present.

When the first of the Approved Type No. 39 was brought out, Lowell Harding, world war ace, general manager of the Flying Service and Chief test pilot of the factory, equipped with parachute, took it out for a performance. He put the plane through every acrobatic maneuvere within his knowledge and experience, ending up with a dive during which he reached a maximum speed of 165 miles an hour and then promptly pulled out. The plane showed no effects whatever from this "beating."

Two "Whirlwind" monoplanes have been produced to date, following the same design except for "beefing" up

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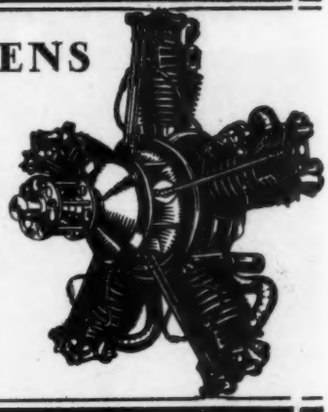

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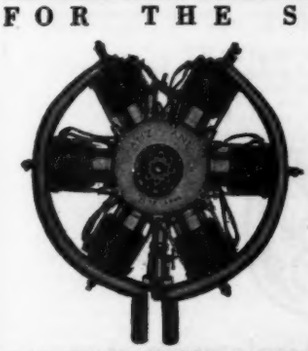

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In addition to Mr. Berliner who is president and chief engineer of the company, the other officers are: Joseph Sanders, vice president and John D. Smoot, secretary-treasurer. Dabney Maury, jr., also a graduate of Massachusetts Institute of Technology, is production manager.

Inspection Methods for Whirlwind Engines

(*Continued from page 257*)

gauge to insure perfect bearing against cylinder walls. Rings failing to meet any of the above requirements are rejected. Rigid inspection of castings is of utmost importance in maintaining Wright standards of quality. Nine different aluminum alloys and eight different bronze alloys are used and careful inspection of castings is inaugurated immediately after castings are knocked from moulds. Each casting and each test bar is stamped with its heat number in order that identification of material may be positively established. The inspector then fills

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out the log sheet for the particular heat, showing the heat number, the different elements going to make up the charge for a particular alloy, the furnace temperature, the pouring temperature, the part number of each piece, the number of pieces poured and the number of pieces accepted on preliminary inspection.

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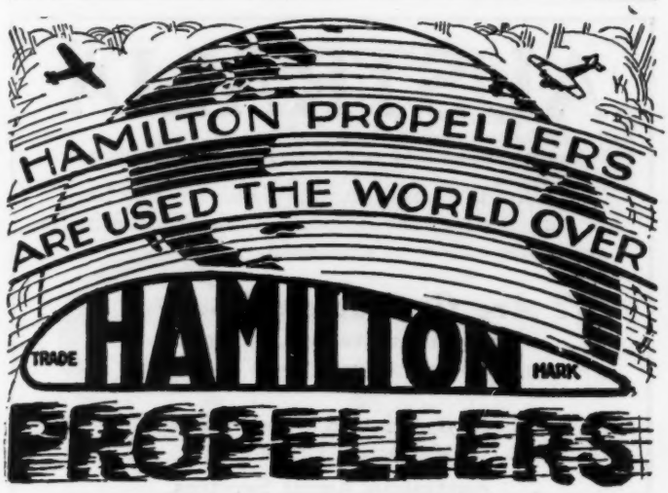

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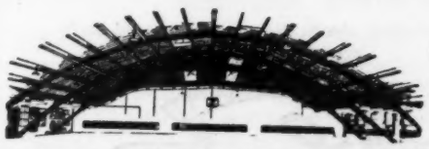

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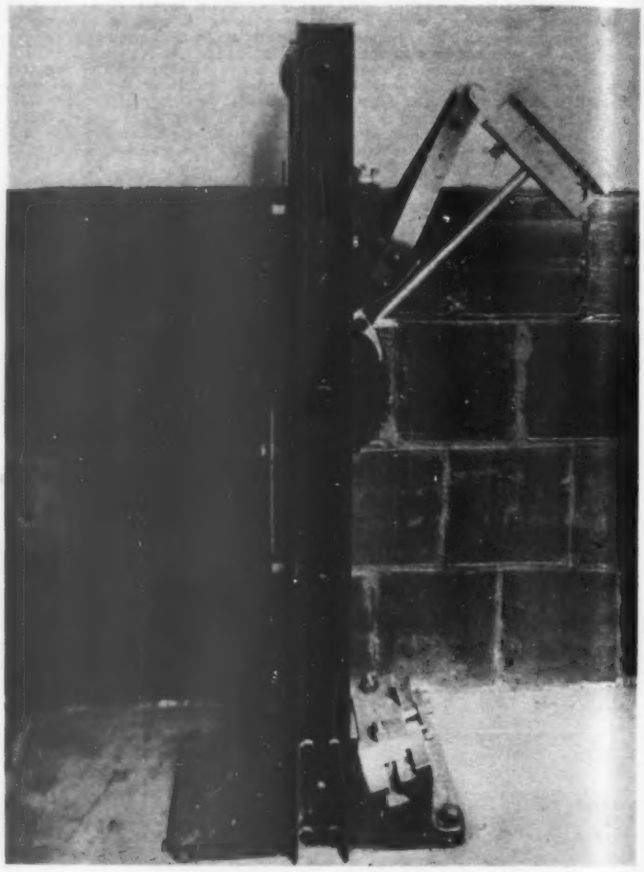

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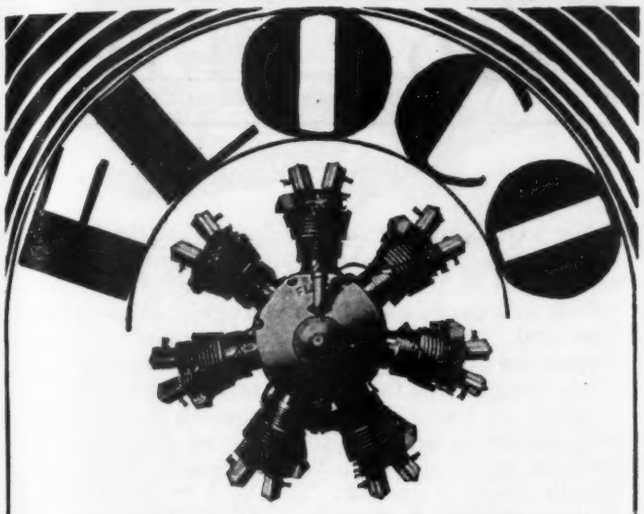

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SIDE SLIPS

By Robert R. Osborn

We were beginning to have hopes that the lady driver had reformed somewhat when she began to transfer her activities from the automobile to the airplane. The excellent records of Lady Heath in England, Misses Earhart, Law, and Stinson over here and a number of other less famous lady fliers, led us to believe that we might expect better things from them in the new air field. However, a couple of Sundays ago at Roosevelt Field, N. Y., a lady student taxied into the wing of the "Roma," the Bellanca plane in which Messrs, Sabelli, Williams, and Bonelli intend to fly from New York to Rome on a perfectly calm day. Fortunately very little damage was done to the tip of the wing, and the imperturable Sabelli rose to the occasion with the statement, "It is nothing. My wing was kissed by a beautiful woman. That is all." Of course it was very nice for Mr. Sabelli to excuse the accident in this way, but it seems to us, gentlemen, that the time to settle this lady driver business in aviation is at the beginning. It so happened that just before we arrived at Roosevelt Field, The Antique Coupe had been kissed on the left rear fender by a lady driver. At least she claimed she was a lady. Our remarks on the occasion, we must admit, were more to the point and more highly colored than were Mr. Sabelli's, but as this was the third time the poor old bus had been so affectionately treated by lady drivers, we think we were justified. So, after hearing the same story for the third time—the lady was sorry it happened but if we hadn't unexpectedly stopped in a normal manner, the accident would never have occurred—we staggered into Roosevelt Field, to hear a report like this. We can all admire the quick thinking and natural gallantry of Mr. Sabelli this first time, but the future must be considered. Suppose all lady flyers who consider themselves beautiful start going around kissing wings—what then?

Something should be done. Maybe we could get Congress to pass a law. Who has any ideas and suggestions?

* * *

In connection with the mysterious disappearance of a passenger from a large airplane, from which he is supposed to have fallen accidentally when he opened the wrong door, a number of tests have been made by apparently skeptical investigators. For one test, according to the news item, "at a height of 1,000 ft. one of the party flung himself against the outer door, which opened about six inches."

Somehow these tests are not completely satisfactory to us. We have a dollar bet that if a man took a long run down the aisle between the seats in the cabin and then threw himself against the outer door it would open wide enough to permit him to fall out. Would one of the party mind making the test for us? And at 1,500 ft. if it wouldn't be inconvenient.

* * *

A test like this one reminds us of the paradox of a "practice" parachute jump. Practice may make for perfection but that certainly is a case where all practice has to be one hundred per cent perfect.

* * *

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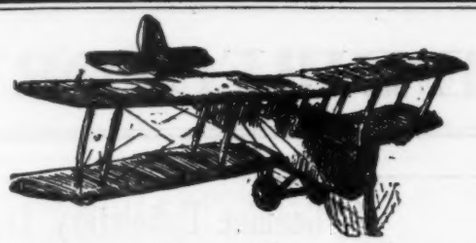

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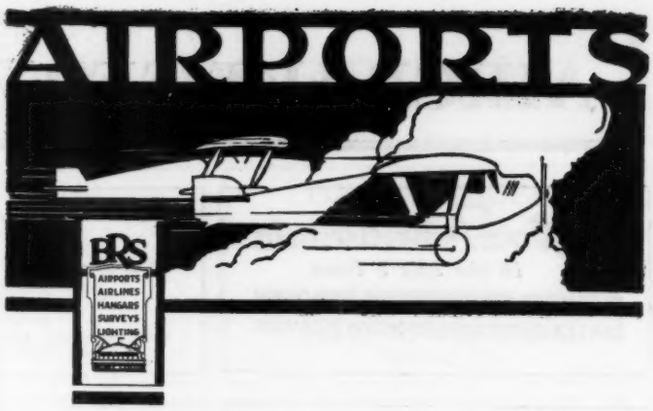

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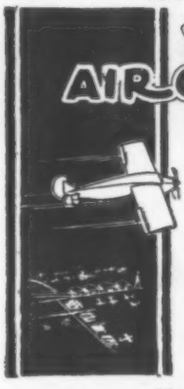

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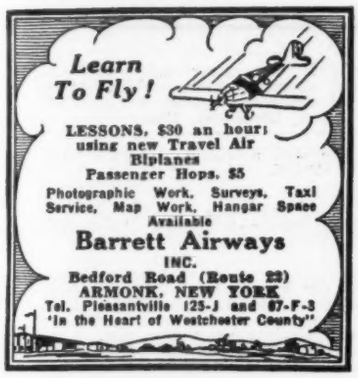
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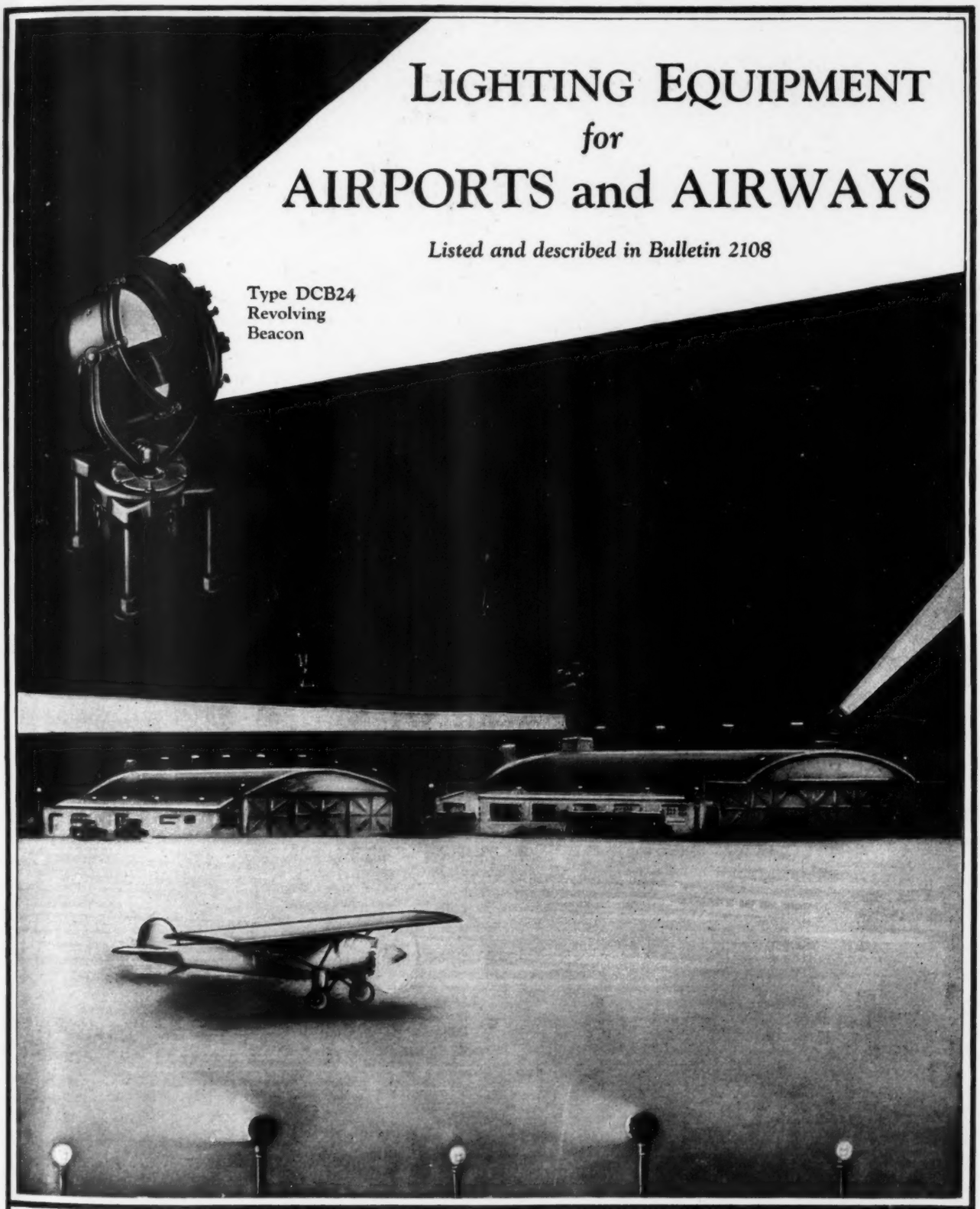

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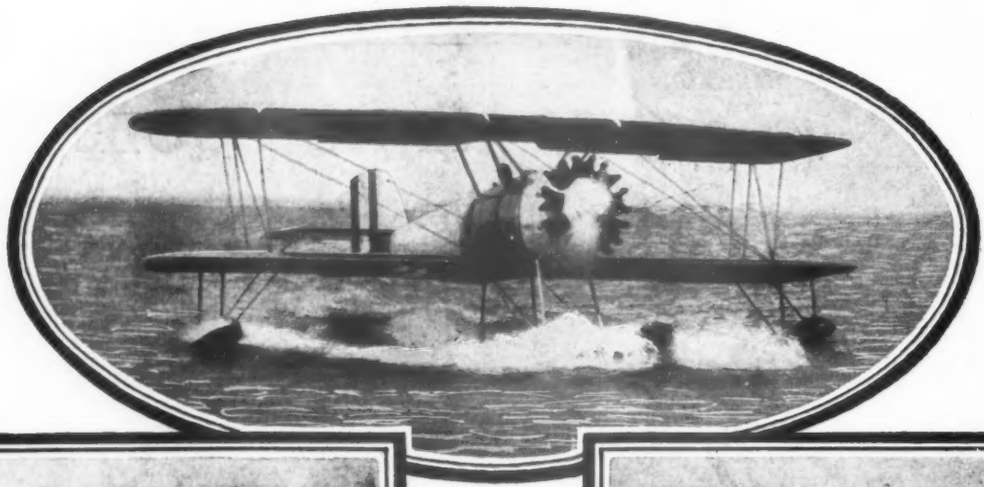

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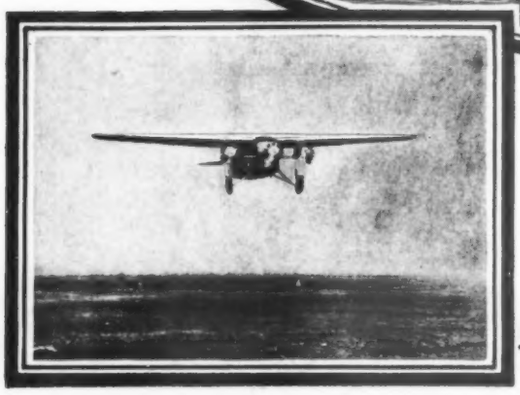

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